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PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

EDITED BY
JOHN NACHBAR, M.A., M.D.
UNDER THE DIRECTION OF
THE EDITORIAL COMMITTEE

VOLUME THE FIRST

SESSION 1907-8

PART II.

LARYNGOLOGICAL SECTION
MEDICAL SECTION
NEUROLOGICAL SECTION
OBSTETRICAL AND GYNÆCOLOGICAL SECTION

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OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE FIRST

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1907-8

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The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

Laryngological Section.

November 1, 1907.

Dr. J. B. Ball, President of the Section, in the Chair.

THE PRESIDENT announced the receipt of several messages wishing success to the Section.

The following communications were made :—

A Microscopic Specimen of a Localised Pulsating Growth of the Middle Turbinate Body which gave rise to Recurrent Attacks of Dangerous Epistaxis.

By ALEXANDER TWEEDIE, F.R.C.S.

The patient, a man, aged 54, had had repeated severe hæmorrhages from the right nostril, uncontrolled by plugging, since October, 1906. In April, 1907, a pulsating area, resembling a diffuse nævus, was seen on the lower border of the middle turbinal. After removal of the middle turbinal the patient has remained well and free from further bleeding.

DISCUSSION.

Dr. PEGLER said he thought it was a pulsating angeioma. Much of the tissue was evidently glandular, in which the glands had undergone atrophic change. Many of the spaces were difficult to define, viz., those with the peculiar mucoid contents ; they were lined with endothelium. He supported the proposition to refer this rare specimen to the Morbid Growths Committee.

Dr. DE HAVILLAND HALL asked how the growth was removed.

Dr. SCANES SPICER said the definite proof of spontaneous bleeding from the middle turbinate region was very important. He had seen three or four cases in which, by exclusion of other sources of hæmorrhage from the nose, he had strong reason for suspecting the middle turbinate, but he had not been able to prove it by ocular demonstration.

Dr. MCKENZIE said that last year, in the *Journal of Laryngology*, Dr. Wyatt Wingrave reported a case of nævoid distension of the middle turbinate which did not cause epistaxis but hemicrania.

Dr. Donelan said he had had a case of secondary hæmorrhage following the use of adrenalin in removal of the middle turbinate. Having tried every other means during twenty-four hours, he remembered having seen Sir Morell Mackenzie use Ruspini's styptic with success in a similar difficulty. In this case a similar result promptly followed. It is believed to be a preparation of the volatile oil of matico, but he was having an analysis made, as there seemed to be need of some styptic that would act promptly on the muscular coats of the blood-vessels when exhausted by the over-stimulation of adrenalin.

Dr. Atwood Thorne proposed that the specimen be referred to the Morbid Growths Committee, and this course was agreed to.

Mr. Tweedie, in reply, said the growth, together with the adjacent mucous membrane, had to be removed rapidly, as the bleeding was severe. This was effected with a spokeshave passed into the nose in the ordinary way, and located with the finger in the posterior choana. The nose was then firmly plugged. The plugging was removed after a few minutes, and all the bleeding had stopped. The maxillary antrum was laid open from the inferior meatus, as an empyema had occurred owing to the swollen middle turbinate body. The nose had been previously plugged on five occasions before the patient was brought to him, and on some of those occasions both with cocaine and adrenalin, but without effect on the epistaxis. Since the operation there had been no more attacks of hæmorrhage.

Paresis of the Right Vocal Cord in a man, aged 40.

By Dan McKenzie, M.D.

The patient, a singer, first experienced three months ago some difficulty in taking the notes in the "upper register." On examination, there was some impairment of the movements of the right cord, there was also some pharyngitis and hypertrophic rhinitis with a small spur on the nasal septum. The lungs appeared to be normal on examination, and the history gave no indication of pulmonary mischief, but, on examining the chest by means of the X-rays, Dr. Hugh Walsham observed distinct signs of fibroid changes in both pulmonary apices.

DISCUSSION.

Dr. Furniss Potter said he failed to detect any paresis. He thought the cord abducted quite actively.

Mr. Clayton Fox said he could not find any paresis.

The President said the man told him that his voice was now better than it had been, so that possibly the case had improved since.

Mr. Nourse said it seemed to him that there was certainly some defective movement, and that the right cord did not move further towards the middle line than the cadaveric position.

Mr. Rose said he examined the case, and agreed that the cord did not move on the right side.

Mr. Horsford said he carefully examined the case, and there was deficient adduction as well as abduction.

Dr. StClair Thomson said he thought both adduction and abduction were all right, but that there was paresis of the tensor muscles, particularly in the right vocal cord, and that gave the appearance of the other cord coming across the middle line, to a very slight degree. The paresis of the tensors would considerably impair the voice.

Dr. McKenzie, in reply, said he had little to say, in view of the conflicting opinions which had been expressed. He thought there was some impairment of movement on the right side, that the right cord did not come quite up to the middle line. The X-ray picture showed fibroid changes in the chest, which might or might not have something to do with the paresis. That the future course of the case would explain—whether it was due to recurrent paralysis of the tenth nerve. He did not think there had been any improvement while he had been seeing the patient.

Fistulous Opening in the Middle Line of the Neck, just above the Hyoid Bone, in a woman, aged 39.

By Dan McKenzie, M.D.

A small lump had been present in this situation as long as the patient could remember; about a year ago this became painful and ruptured, discharging a watery fluid, and the sinus so formed continues to discharge. A cord-like swelling can be felt leading upwards and backwards towards the base of the tongue. Two points of interest are the exceptional position of the opening above the hyoid bone and the late period of life at which the sinus has opened.

DISCUSSION.

Dr. Watson Williams considered it was a case of persistent thyro-glossal duct, and that the only treatment would be to dissect out as much of the duct as could be got at. He believed the duct in the present case opened below the basi-hyoid, and that would point to it being a thyro-glossal duct taking the ordinary course.

Mr. de Santi thought it was a thyro-glossal cyst. In order to get it away completely it would be necessary to make a deep dissection, following up the fistulous tract to its very end, otherwise the attempt would end in failure. The old treatment was scraping, which proved useless. He advised operation in the case.

Dr. Scanes Spicer agreed with the opinions expressed as to the nature and treatment of this case It took a patient of his nearly a year to get completely well after dissecting out a fistulous suppurating persistent thyro-glossal duct; but she had remained well two years. He thought that, in the case shown, the swelling appeared to arise above the hyoid because of the cicatrix, which had been pulled up.

Dr. DUNDAS GRANT said there was a peculiarity about the case which had not been remarked upon, namely, a swelling close up under the chin, which was not usual in thyro-lingual sinuses, and which, he thought, required some explanation, though he was not able to give it. He had tried to pass a fine probe through the sinus, but had not been able to get it any distance. He thought the sinus was below the hyoid bone. In some points the case differed from typical thyro-lingual duct, particularly in the swelling beneath the chin.

Dr. STCLAIR THOMSON agreed as to the difficulty in dissecting out such conditions and the necessity for going deeply. He reminded members of the advantage of splitting the hyoid bone as the only method of getting at the base of the trouble. That was not an original suggestion, but was advocated in a paper read before the Medico-Chirurgical Society by, he thought, Mr. Herbert Durham. There was no harm in splitting the hyoid, which took one down towards the foramen cæcum. If he had another such case he would use preliminary injections of adrenalin, so as to make the dissection as bloodless as possible.

Mr. CLAYTON FOX said that in a case on which he operated at the Metropolitan Throat and Nose Hospital he found it sufficient to pull forward the body of the hyoid bone, and thus get the duct free up to the foramen cæcum.

Dr. PEGLER said that Dr. Frederick Spicer and he had a case together, in which he had dissected out the duct without interfering with the hyoid, and there had been no recurrence.

The PRESIDENT said that, of course, many cases had been done without splitting the hyoid, but he understood Dr. StClair Thomson to mean that such a course facilitated the operation, and ensured greater success.

Dr. DUNDAS GRANT said that electrolysis was not to be despised in such cases. He had a case which recurred, and before operating on it again he, with the co-operation of Dr. Lewis Jones, applied electrolysis to the whole length of the sinus; afterwards he dissected it out completely. The microscope showed that the epithelial layers were completely destroyed, and possibly, without the dissection, the electrolysis would have cured it. He did not divide the hyoid bone, and no recurrence took place, although more than a year had elapsed.

Dr. MCKENZIE, in reply, said it was owing to Dr. Grant having discovered the swelling above the opening that he had omitted mention of what was really his opinion, that it was a thyro-glossal duct. His own opinion still was that the fistulous opening was above the hyoid bone; it might be that it tracked down under the hyoid, but the opening was above it. The other feature of interest was the age of the patient. As a rule such cases were much earlier seen than at 39 years of age.

Part of the Breast-bone of a Chicken, which had been impacted in the Larynx for nearly Forty-eight Hours.

By F. A. Rose, F.R.C.S.

The piece of bone is a thin plate measuring 1 inch in length, and over ¾ inch in width. The patient, a girl, aged 19, choked violently while drinking some broth ; the voice was completely lost, and there was some pain and discomfort, but no cough or dyspnœa, and she was able to swallow. The bone lay in the larynx, with its upper edge pressing against the posterior wall above the cords, and the lower end against the anterior wall of the trachea. Attention was drawn to the large size of the bone and to the entire absence of dyspnœa and cough.

DISCUSSION.

Dr. Donelan asked what was the nature of the impaction, and in what portion of the larynx it was fixed. He had a case in which a portion of rabbit's rib was impacted in the ventricles crossing the cords at the junction of the anterior and middle thirds, and it had been there since two o'clock on the previous day. There was practically no dyspnœa, but a good deal of pain.

Dr. William Hill said he thought the reason there was no dyspnœa in such a case was that the foreign body was often impacted transversely in the two ventricles, and thus acted as a dilator in the larynx. The absence of cough was not so easily explained.

Dr. Jobson Horne said the case reminded him of one which he saw some years ago, in which a piece of a celluloid ball had been lodged in the larynx for a month. The patient, he understood, had been a fortnight under treatment for bronchitis before it was found out.

Mr. Rose, in reply, said the bone lay as a median partition in the larynx, one part being below the cords and the other part above. It was in an anterior posterior plane. The bone was so thin that the cords were almost able to meet. The patient could speak, but her voice was weak. At first he did not think there was anything in the larynx.

A Case of Extreme Form of Septal Deflection.

By Harold Barwell, F.R.C.S.

In this patient, a woman, aged 25, the septum was bent completely back upon itself so as to form an S-shaped figure on vertical coronal section. Opinions were solicited as to what means might be adopted to rectify the deformity.

DISCUSSION.

Dr. Dundas Grant thought it should be dealt with by the submucous resection method. It was impossible to tell beforehand whether the mucoperiosteum could be turned out, because it occupied a portion of the bony septum with a deep groove, which was characteristic of traumatic deflection. If that could not be done, at all events he could do it on the side which was convex. He considered that that was the best treatment.

Dr. Scanes Spicer said he did not consider the case required any treatment of the septum. But he thought the respiratory habit of the patient was below par, and that she required to be taught to breathe properly.

Mr. de Santi said he was sure the case did not require operation.

Mr. Stuart Low said he agreed with the remarks of other speakers. It would be difficult to perform an operation on the septum without making a perforation, and perhaps a large one. He would prefer to perform the operation which he had introduced and described, viz., submucous turbinectomy. It was not a condition which could be influenced with the cautery. The patient had not much nasal obstruction. There was some paresis of the palate, and the nasal roof was very low.

Mr. Clayton Fox said that the best operation would be the Krieg-Boenninghaus, in which one could make sure of securing the entirety of the mucosa on the right side, disregarding that on the left, where the sulcus was situated. But he would prefer to do nothing in this particular case.

Dr. StClair Thomson suggested to Mr. Barwell to withdraw the adjective "extreme" because, if that was applicable to the present case, he could show others which could only be termed outrageous. Unless the patient had symptoms referable to the condition, he would leave it alone. In any case he would certainly object to the Krieg-Boenninghaus. There should be no direct attempt to destroy valuable mucosa. It was difficult to get the mucosa out of a deep depression, but the difficulty would be less if a few points were kept in mind. One was to operate always on the convex side, and another was not to be anxious to get out a big piece of the septum; the surgeon being content with getting it away in small sections.

Dr. Donelan pointed out that there was not free respiration at night, as the patient could not sleep with her mouth shut.

Mr. Cresswell Baber thought that if there were any necessity for operation in the case—which seemed doubtful—sufficient breathing way might be obtained by removing the unciform projection on the septum. He had seen a similar condition before, but not as marked as in the present case.

The President said he thought one could perform a submucous resection without much difficulty. He did not think one could guarantee not to make a perforation; it would happen sometimes, even in cases where it was not expected, but especially where there was some morbid adhesion.

Mr. Barwell, in reply, said the condition was found by accident, and the patient had not asked him to operate or to treat her in any way; he could not make up his mind to do so until she wanted something done. But, if he were to operate, he thought he would attempt submucous resection. When the cartilage was taken out there would be a redundancy of mucous membrane, so that, if there were perforation on the left side, he did not think there would be much harm done. He must decline to recant the term "extreme"; the septum was so bent on itself that if a needle were pushed through at one spot it would penetrate the septum three separate times.

Case of a man on whom Thyrotomy had been performed one year and nine months before for Tuberculous Laryngitis.

By Harold Barwell, F.R.C.S.

The patient, now aged 23, suffered in August, 1904, from hoarseness, which rapidly progressed to complete aphonia. In June, 1905, he came under the care of Dr. Trevelyan, of Leeds, who diagnosed tuberculous laryngitis, and sent him up to Mount Vernon Hospital. The general health was good, and it was only after repeated examination that signs of phthisis could be detected at the left apex; sputum was scanty, and no tubercle bacilli could be found; the temperature was normal. There was much infiltration within both ventricles hiding the cords. Thyrotomy was performed in January, 1906, the diseased part cut away, the larynx scraped, and a pigment containing lactic acid applied; the tracheotomy tube was removed on the table. After healing well the wound broke down, forming a sinus leading into the trachea. He was discharged in June with the larynx healed but a small sinus remaining in the neck. This has now healed, the phthisis is quiescent, the voice is distinct though gruff, and the larynx remains healed as it was sixteen months ago.

DISCUSSION.

Dr. de Havilland Hall asked what was the condition of the lungs when the treatment was undertaken, and whether Mr. Barwell would have carried out the same treatment if the patient had been well enough off to go to a sanatorium for six months and have entire rest in the open air. It was astonishing to see the results from vocal rest, and also physical rest in some such cases of tuberculous laryngitis.

Dr. Dundas Grant said the case was interesting as showing that it was sometimes justifiable to do thyrotomy in the presence of tuberculous laryngitis. In the present case he would have hesitated before doing it, but it could be done for exploratory purposes, because there were sometimes sequestra of one or other of the cartilages, the arytænoid, or possibly the posterior part of the cricoid, which might be removed by thyrotomy.

Mr. Herbert Tilley said one must reckon in such a case to get the wound afterwards infected with tubercle bacilli. He had recorded a similar case in the *British Medical Journal* of a fortnight ago, in connection with the recent meeting of the Association at Exeter. It occurred in a male, suffering from what appeared to be malignant disease of the left cord, but who in other respects seemed healthy; there were no physical signs in the chest and no tubercle bacilli were found in the expectoration. Consultations were held and the view of malignant disease confirmed. When the larynx was opened the tissues were found to be soft, and suspicion was aroused that the disease might not be malignant; sections examined under the microscope showed the presence of tubercle nodules. The wounds at first healed well, and then the skin incision broke down, leaving a granulating sore half an inch wide. This eventually healed again, and the patient had remained well during the last two years.

Dr. W. Hill said it was exceptionally necessary to do something surgical in such cases, as in one he had recently under his care, in which there was much ulceration and swelling in the larynx in the neighbourhood of the ventricle on the right side. He saw the case later, with what he took to be perichondritis, with much swelling and fluctuation in the neck, which made it necessary for him to resort to surgery. He did a lateral laryngotomy, going through the thyro-hyoid membrane and scraping the ventricle. He found pus outside the larynx, and in following the abscess his instrument went through the thyro-hyoid membrane; possibly this had been perforated by granulations. The laryngeal condition was much improved by the operation, and the temperature became normal, but though the patient had been at Boscombe for six weeks the external wound in the neck had not yet healed.

Dr. Jobson Horne said he could support what had been said by Dr. de Havilland Hall, and what had several times been remarked by Dr. StClair Thomson concerning the treatment of such cases by rest of the voice. During a recent visit to Dartmoor convict prison, where rest of voice is enforced, he was impressed by the almost complete absence of laryngeal tuberculosis.

Mr. Barwell, in reply, said there was no firmer believer than himself in the treatment of such cases at sanatoria and by silence. He saw much laryngeal tuberculosis, but the present was the only case in which he had ever done thyrotomy; it was an exceptional case. There was very slight disease in the lung, and it required several examinations to detect it at all. There was much infiltration in the larynx, and the disease could not have been got at properly by instruments inserted through the mouth. There had been fifteen months aphonia before operation. He would not recommend the routine treatment of these cases by thyrotomy.

A Case of Tumour of the Vocal Cord.

By L. Hemington Pegler, M.D.

The patient, a woman, aged 30, had a history of voice interference of some years duration. From the anterior two-thirds of the left vocal cord, which is red and swollen, the tumour depends; it is pale, œdematous, and rather thick, and at least twice the breadth of the vocal cord; flap-shaped, it is attached by its entire base, and being very mobile is displaced upwards on phonation.

DISCUSSION.

Mr. de Santi said he did not think there could be any doubt that it was an œdematous fibroma.

Mr. Robinson agreed that it was a fibroma.

Mr. Barwell said he did not think it was a fibroma because it had a broad pedicle by which it was attached along the entire length of the vocal cord.

Dr. StClair Thomson said the case was almost identical with that of a woman he showed with a so-called "prolapse of the ventricle of Morgagni." It quivered in the same way as the present case did, hung over the cord, and extended two-thirds of its length. It was removed, and reported to be simply œdematous tissue. He thought this was on the surface of the cord.

Dr. Clayton Fox said he agreed with Dr. Thomson, and he thought the part which was hanging over the upper border of the anterior third of the left vocal cord was the thin flat pedicle of a polypus, originating in œdema of one of the corrugations normally existing in the upper and outer wall of the ventricle.

Dr. Pegler, in reply, said that if the last two speakers had had the opportunity, as he had, of cocainising the larynx and examining the growth with the aid of a probe they would not hold their opinion. His investigations convinced him that the growth was an extension from the border of the left vocal cord, but he would show the patient again after its removal.

Extensive Tuberculosis of the Larynx in a woman, aged 40, completely Cicatrised after treatment with the Galvano-cautery and Tracheotomy.

By StClair Thomson, M.D.

Dr. Dundas Grant supported the recommendation of treatment by galvano-cautery.

A Tumour removed from the Naso-pharynx of a girl, aged 11, fifteen weeks after the operative removal of Adenoids.

By E. Furniss Potter, M.D.

The patient complained of pain on swallowing and slight bleeding from the throat. The left choana was obscured by a dark-coloured lump attached to the posterior wall. This was removed and seen to be a firm, rounded body about the size of a small grape, enclosed in a membranous capsule, and had been attached by a pedicle to the posterior wall of the naso-pharynx. Prior to the adenoid operation a satisfactory view of the post-nasal space had been obtained and nothing unusual noticed.

DISCUSSION.

Dr. W. H. Kelson reported that the microscopic section showed chiefly loose fibrous tissue with much extravasated blood; numerous oval spaces were present and some flattened and some round-cells. The tissue was much condensed on the surface and appeared to be only partially developed.

Mr. Robinson said he had previously seen tumours of that character, where a piece of adenoid had been imperfectly separated below, and had hung down, and the clot over it had become partially organised. He did not think there was anything more here than clot and some fibrous tissue.

Mr. Rose said he thought it was blood-clot; he did not see any adenoid tissue.

Dr. Pegler agreed that it consisted of blood-clot that was not completely organised.

Further Notes on a Case of Extensive Cellulitis of the right side of the Neck.

(Shown at the meeting of the Laryngological Society in January, 1907, and again reported upon at the meeting in February, 1907.)

By Peter Abercrombie, M.D.

The patient at that time presented septic adenitis and cellulitis on the right side of the neck, together with acute septic pharyngitis and œdema of the right side of the larynx. A deep-seated abscess formed in the neck, was opened on January 12, and healed up well, but dysphagia persisted, although less severely, and the redness and swelling of the right side of the epiglottis did not entirely disappear. Early in June a piece of the epiglottis was punched out for examination, and was reported by Dr. Wyatt Wingrave to be epitheliomatous. Transhyoid pharyngotomy was performed, and the right side of the epiglottis was removed, the disease being entirely confined to that side. The subsequent progress has been most satisfactory, and all pain has disappeared.

The microscopic section was exhibited.

DISCUSSION.

Mr. de Santi said he remembered the case very well when shown in January, and had expressed the opinion then that it was malignant. Others thought the glandular swelling a septic abscess of the neck, and there was a question whether the trouble was due to a chancre of the tonsil. The patient had had something done to the tonsil, and it was thought that septic infection of the cervical glands had followed. It was now shown with apparently an abscess healed, but there was still a most suspicious fixed, deep, glandular swelling. It is now reported that he has had epithelioma of the epiglottis, but that was not noticed or referred to at the January or February meetings. The question was whether malignant disease of the epiglottis had come on irrespective of the condition present in January. His own opinion was that malignant disease of the epiglottis was present in an early stage in January, with glandular involvement and septic infection of the affected glands. He did not think enough had been done by the operation of removal of half the epiglottis and nothing else. It was a dangerous operation for a case showing epithelioma of the epiglottis. If the case had been his, not only would he have removed the whole of the epiglottis but all the glands possible on the affected side of the neck. There was a deep glandular swelling now, and this was almost certainly malignant in nature.

Mr. Robinson said there was a lump still present on the right side, which was probably a gland. He thought it should be explored. His opinion was still that it was malignant.

Mr. Horsford said he saw the case himself, but Mr. de Santi had said there was then no report of the condition of the larynx. At the time he (Mr. Horsford) described œdema of the right half of the larynx ; and he did not think there was any growth below the epiglottis, but he now thought that the œdema may have been an early sign of the growth.

Dr. Abercrombie, in reply, said the glandular swelling had been getting less the last few months, and he thought it was the remains of the old septic trouble.

Functional Paresis of the Palate and Cords in a woman, aged 23.

By E. A. Peters, M.D.

The patient was anæmic and had a general enlargement of the thyroid gland, with a thyroid cyst. The pulse was rapid, with a frequency of 100 to 110 per minute, but there was no definite proptosis. There had been rigidity of the deep muscles of the right side of the neck for two months. On attempted phonation there was incomplete approximation of the cords and the palate failed to move, but on stimulating the palate and larynx the normal movement could usually be obtained.

Laryngeal Disease in a man, aged 40.

By Frederick Spicer, M.D.

The patient was first seen in 1903, complaining of hoarseness of three months duration ; the larynx presented diffuse inflammation, the cords were swollen and discoloured but freely movable, and there was a small nodule on the left cord. After simple treatment and rest of the voice he was discharged apparently cured in April, 1904. He was seen again in May, 1907, having lost his voice for six months; the larynx was inflamed, the left cord greatly swollen, covered with granulations and completely fixed, and an enlarged gland was palpable in the neck. Mercury and iodide were prescribed, and there has since been steady improvement, but there is still much thickening and jagged ulceration. There is no history of syphilis or tubercle, no loss of flesh, and a negative result on examination of the lungs and sputum. The exhibitor considered that the case was probably syphilitic.

DISCUSSION.

Dr. Scanes Spicer said he thought it was commencing malignant disease. The age of the patient was in favour of it, and he thought it could very well be removed by thyrotomy.

Mr. de Santi regarded it as doubtful in nature, but advocated exploration by thyrotomy and dealing with whatever was found. If it were syphilitic, or something inflammatory, the disease could be removed in that way and no harm done, whereas if it were malignant, and his opinion somewhat inclined that way—the diagnosis could be established and the disease extirpated at the same time.

Dr. W. Hill recommended Dr. Spicer to punch out a piece, and if it proved to be malignant, a thyro-fissure would be indicated. The history was much against malignancy, and he could scarcely imagine cancer remaining intrinsic for four years.

Dr. F. Spicer, in reply, thanked members for their opinions, and said he would probably have a piece removed. It was a very anxious case.

A Case of Laryngeal Disease for Diagnosis.

By Scanes Spicer, M.D.

The patient is a man, aged 38; hoarse ten years; crateriform ulcer on left ventricular band; small ragged process and ulcer on left vocal cord, but no impairment of mobility; much pain and difficulty of swallowing at times; rapid loss of weight.

Mr. Barwell said it was almost impossible to give an opinion of any value from inspection alone. The appearance was consistent with tubercle. The hoarseness of ten years ago might be due to something else; that hoarseness was now worse, and the present disease might very well be of comparatively recent date.

Anosmia, Dryness and Crustings of the Nose in a man, aged 30.

By Clayton Fox, F.R.C.S.I.

The patient had been suffering from this complaint for the past year. The bridge of the nose was depressed, the alæ flattened, and the fossæ were abnormally wide. There was no atrophy of the turbinated bodies or mucosa, but the latter was more or less constantly covered with fine crusts and dust. Neither subjective nor objective fœtor has ever been complained of. The case was shown to elicit discussion as to the etiology of the physical conditions of the nose on which the trouble probably depends.

Results of Double Frontal Sinus Operation.

By StClair Thomson, M.D.

A man, aged 46, shown before the Laryngological Society, January, 1901 (*vide Proceedings of the Laryngological Society of London*, vol. viii., p. 52), after an Ogston-Luc on right frontal sinus and a Caldwell-Luc on right antrum. The patient returned this year with suppuration in left frontal sinus. The ethmoid was first cleared, and the frontal sinus washed out on forty-four occasions. As no cure resulted, a Killian operation was performed in July. The case affords the opportunity of comparing the Ogston-Luc with the Killian operation on the same patient. The left frontal sinus was very extensive.

A Case of Symmetrical Neoplasms on the Vocal Cords.

By Jobson Horne, M.D.

The patient, a woman, aged 27, had experienced impairment of voice since 5 years of age, which was not attributed to any illness. At that time the patient was taken to a throat hospital, but no treatment of an operative nature was undertaken. At the ages of 22 and 25 the patient underwent laryngeal operations for the removal of a growth. The larynx now presented a growth attached to the posterior third of the right vocal cord, and evidence of one having been removed from a symmetrical position on the left vocal cord. The cords moved equally and freely, and the larynx, in other respects, presented a normal appearance. Dr. Horne showed the case prior to removing the growth.

A Case of Diffuse Gummatous Infiltration of the Left Half of the Nose.

By JOBSON HORNE, M.D.

The patient, a man, aged 27, presented himself at hospital on October 23, 1907, complaining of extreme nasal obstruction of fourteen days' duration; the onset was gradual, without pain, but with a thin watery discharge. The lumen of the left nasal fossa was completely occluded by the apposition of the swollen external wall and septum. The swelling occasioned some external disfigurement on the left side. There was a history of a sore on the genitals six or seven years ago. The case was shown as one of the less usual forms of syphilis of the nose and also to illustrate the rapidity with which such cases yield to the administration of mercury with iodide of potassium; within seven days a marked improvement in the condition had taken place.

A Case of Nasal Syphilis.

By HERBERT TILLEY, M.D.

A man, aged 39, in whom the tip of the nose was very much swollen, congested, and extremely tender. The "columna nasi" was at least twice its normal thickness. The nasal septum was deeply ulcerated. The condition pointed to acute septic infection in addition to specific inflammation of the nose. The patient was taking large doses of iodide of potash, with mercury inunction.

Mr. STUART LOW thought that most probably necrosed bone was responsible for the condition.

Laryngological Section.

December 6, 1907.

Dr. J. Barry Ball, President of the Section, in the Chair.

Report of the Morbid Growths Committee.

Mr. Alexander Tweedie's specimen of pulsating growth in the middle turbinal (shown at the meeting of November 1; *see* p. 1): "This is an adenoma, part of which shows active growth and part marked dilatation of the acini. There is a patch of blood-clot on the surface indicating the site of the severe hæmorrhage."

A Case of Atresia of the Naso-Pharynx.

By Coubro Potter, M.D.

The patient, a youth, aged 21, complained of obstructed nasal respiration. The uvula was absent; the fauces and the soft palate presented evidence of old ulceration which had become quiescent. The palate was adherent to the posterior wall of the pharynx, and the communication between the pharynx and the post-nasal space was reduced to an opening no larger than the orifice of an Eustachian tube. The epiglottis was infiltrated and distorted, overhanging the vocal cords and the intrinsic parts of the larynx, which appeared to be normal. There was no dysphagia, no specific history, no evidence of skin lesions, no sputum, and the temperature was normal. Four years ago an enlarged gland was removed from the neck.

The case was exhibited prior to any operative measures being undertaken, not with a view of inviting discussion on the various surgical and mechanical methods in vogue for overcoming atresia in this region, but with a view of eliciting opinions on the pathology of the condition, and also whether surgical interference was in any way contraindicated.

DISCUSSION.

Mr. CRESSWELL BABER asked whether there had been any infectious disease with ulceration in the case, such as scarlet fever; also whether the tuberculin eye-test had been tried.

Mr. DE SANTI said he thought it was lupoid. It was possible to still see some nodules like those of lupus in the palate. He believed the condition of the palate was very unsuitable for operation. If it were operated upon the tissue would give way and there would be no good result.

The PRESIDENT called attention to the fact that the adhesion was not giving the patient any great inconvenience; he could breathe through the nose fairly well.

The SECRETARY (Dr. Jobson Horne) said that in the absence of Dr. Coubro Potter he could not say whether there had been any infectious disease such as scarlet fever in the case. He was not aware that any tuberculin test had been applied. The views expressed by Mr. de Santi, both as to the nature of the condition and also as to the prognosis should there be surgical intervention, coincided with his own.

A Case of "Bridle" Formation in the Larynx.

By HERBERT TILLEY, F.R.C.S.

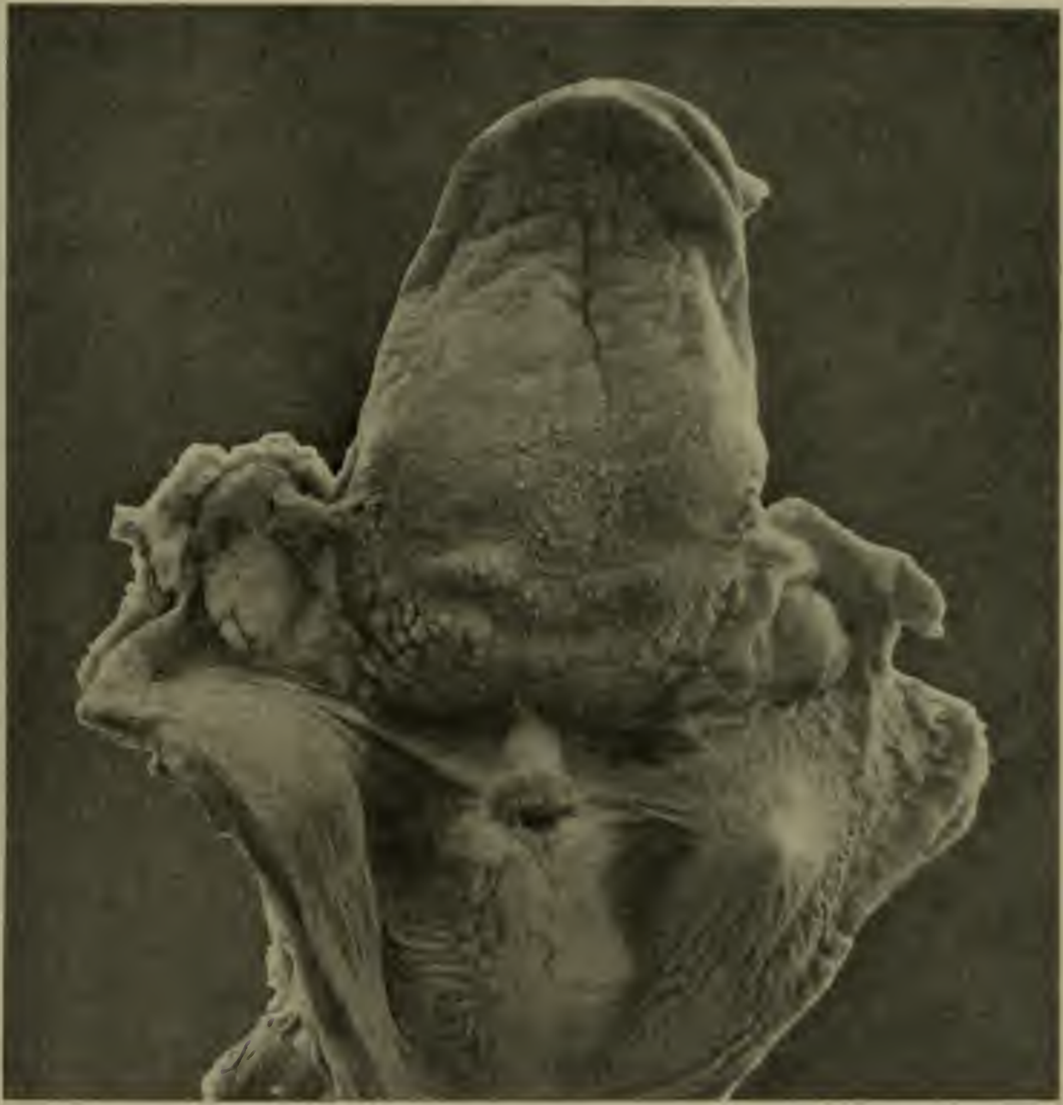
THE patient, a man, aged 30, had suffered from tertiary syphilis, and now showed a curious "bridle" formation in the region of the left ventricular band.

A Specimen of Leprosy of the Larynx.

By ARTHUR EVANS, M.S.

THE patient, a man, aged 21, a native of the West Indies, was admitted into the Seamen's Hospital in May, 1906. Ulceration had appeared on the face two and a half years before; this healed within three months, reappeared after ten months and slowly spread. There was never any pain. The patient had never to his knowledge been exposed to infection. On admission there was extensive ulceration on the brow and cheeks, and the nose was almost destroyed. Respiration was noisy and there was marked loss of voice. Old scars were visible on the legs and near the ankle; these were anæsthetic to light touch. The laryngoscope showed the epiglottis to be much smaller than normal, its edges were incurved, and completely hid the interior of the larynx.

The patient died in November, 1906, and the spleen and liver were teeming with leprosy bacilli. The specimen shows very marked contraction of the upper aperture; the epiglottis is much shrunken and folded, the arytæno-epiglottidean fold is so much contracted that the margins of the epiglottis are in contact with the arytænoid cartilages. This is due to contraction of the fibrous tissue which results from a small cell infiltration in the early stage of the disease. The vocal cords appear to be normal. The dyspnœa was not so marked as to suggest the advisability of performing tracheotomy, and it appears that this operation is practically never needed in cases of leprosy, although dyspnœa is a common symptom.



Leprosy of the Larynx.

A Case of Congestion of the Right Vocal Cord.

By HERBERT TILLEY, F.R.C.S.

A MAN, aged 46. Loss of voice for two months, with no history of tuberculosis or syphilis. The larynx showed a granular congestion of the right vocal cord, with slight impairment of movement. There had been no improvement under full doses of iodide of potassium and mercury. The principal question at issue was whether the lesion was of a malignant nature.

DISCUSSION.

Sir FELIX SEMON said he thought it was very difficult to form an opinion about the case. Although he had looked carefully he could not discover any impairment of mobility at all. He would like to warn members not to conclude too quickly that the condition must be either tubercle, or syphilis, or a malignant growth; there was always the possibility of its being an unusual form of chronic laryngitis affecting one vocal cord only. While it was a very good diagnostic sign—and he would be the last to detract from its value—he thought an observer should give a guarded opinion when he saw unilateral congestion of a vocal cord, because it did not always necessarily mean the development of some graver disease. There certainly were some cases of simple chronic inflammation which did not lead to any further trouble, and which affected only one side of the larynx. He believed the present case was one of simple chronic unilateral laryngitis, and not one of new growth.

The PRESIDENT asked how long the case had been under Mr. Tilley's observation.

Mr. HERBERT TILLEY, in reply, said the patient had been under his observation about six weeks, during which time he had seen him twice. He put him on 15 gr. doses of iodide of potassium, with 1 drachm of the perchloride of mercury, and he said he was very much better. But he did not see any difference in the appearance of the larynx or the clearness of the voice. If the patient were very quietly examined it would be seen that below the left cord was a greyish patch and the cord thickened, and this, he believed, was superficial ulceration. He believed that that really was seen by some that day. There was puffy, granular congestion. The man was in good health, not losing weight, very fit, and came of a healthy family. There was no history of venereal disease. He did not know what the condition was due to.

Symmetrical Nodules on the Cords of a Boy, aged 9.

By HAROLD BARWELL, F.R.C.S.

THE boy complained of hoarseness of two months' duration, which was steadily getting worse. He was in ailing health, but showed no sign of tuberculosis. He did not sing, nor was he in the habit of exerting the voice unduly.

DISCUSSION.

Mr. HERBERT TILLEY said he saw a boy, aged 11, with the same condition about two months ago. That boy appeared to have had no unusual voice strain, such as singing in a choir, but it was said that he was very noisy in the playground.

Mr. CLAYTON FOX thought the case a very useful one in showing that besides defective voice production and nodal attrition, which were not likely to be causal factors in this particular instance, there was another theory which might fit the present case, viz., non-absorption of the embryonic web between the anterior third of the cords in the anterior commissure. If this were not complete, nodes could arise from the remnants.

Sir FELIX SEMON said that while a symmetrical condition of that kind was rare in children, unilateral nodules in the larynx in even smaller children were anything but seldom met with. He had seen a considerable number of children who had been brought to him for advice at an early age on account of huskiness of the voice, from which they had suffered practically since birth, so that it was likely the condition was congenital. He thought the suggestion of the last speaker was very reasonable and likely to be correct. As to treatment, he had always advised, unless there were real need on account of occupation, to leave the nodules alone, at least until the child was older, because in many cases spontaneous and considerable improvement, if not complete cure, resulted at the age of puberty.

A Case of Gumma of the Larynx.

By LAWRENCE JONES, M.S.

(Introduced by Mr. HAROLD BARWELL.)

THE patient, a carman, aged 34, was first seen on October 25, 1907, complaining of a gradually increasing swelling in the neck and loss of voice of fourteen months' duration. History of a sore on the penis in 1897, followed by an abscess in the groin, for which he received fourteen days' treatment. There was in the neck a firm, rounded swelling about the size of a Tangerine orange, adherent to the skin and fixed to the left side of the thyroid cartilage, pushing the larynx over to the right and extending downwards as far as the first ring of the trachea. There was no dyspnœa or stridor, but the voice was very husky. Mr. Barwell, who examined the larynx, reported that there was a large œdematous swelling of the left arytænoid, extending down to the level of the cricoid; the left ventricular band was pushed inwards by a large rounded swelling and the left arytænoid was absolutely fixed. He diagnosed syphilitic perichondritis of the thyroid and arytænoid cartilages and probably also of the cricoid. He was given 15 gr. of potassium iodide with 1 drachm of liquor. hydrargyri perchloridi three times a day, but by November 5 he was showing symptoms of iodism and the central part of the swelling was now reddened and fluctuating. He was then admitted and, on the suggestion of Dr. Wilfred Fox, he received daily injections of 2·5 to 3·0 c.c. of a 1 per cent. solution of benzoate of mercury, and calcium iodo-ricinoleate was administered by the mouth. Under this treatment the swelling has become much smaller and is now neither red nor fluctuating, whilst the larynx also shows much improvement.

DISCUSSION.

Mr. BARWELL said he had seen the patient both in and out of the hospital, and he was most resistent to mercury and potassium iodide given by the mouth, but reacted with great rapidity when the benzoate of mercury was injected. He had been very susceptible to iodide of potassium, but had taken the complex salt without trouble and with most beneficial results. Previously to this treatment the swelling in the neck was pointing and apparently about to rupture, but it had now almost disappeared.

Dr. BRONNER asked whether Mr. Jones had tried the syrup of hyperiodic acid. Those who had used it said it was very good in the cases which did not take the ordinary iodide well. He had himself not seen a case in which it was not taken well.

Mr. STUART-LOW said that a short time ago he had a case of this kind, only more extensive, in which, before he saw it, there had been a breaking down, so that a deep-seated abscess had formed. Parke Davis's polyvalent antistreptococcic serum was used, and the effect was to disperse the induration, resulting in recovery in about a fortnight. Previously, antisyphilitic treatment had been employed, and this had done good in the interior of the larynx, but an abscess had formed outside, over the laryngeal cartilages and in front of the trachea, and it was this condition that the polyvalent antistreptococcic serum proved so effective in remedying.

Mr. LAWRENCE JONES, in reply, said the substitute for iodide of potassium was given to the present patient, and he tolerated it well. Starting with 3 gr. three times a day he was now taking 6 gr. three times a day. He seems very susceptible to iodide, and with 10 gr. three times a day coryza developed and the usual symptoms of iodism. When the injection treatment was started the lesion was fluctuating over an area the size of half a crown. Within a week of starting that treatment the lesion had puckered up and the fluctuation had disappeared.

Bilateral Sarcoma of the Upper Maxillæ.

(With Microscopical Section.)

By ARTHUR HUTCHISON, M.B.

THE patient, a boy, aged 15, suffered three years ago from nasal obstruction, which, however, seemed to have passed off; in July, 1906, the obstruction returned, accompanied by swelling of the face, which rapidly increased. When first examined, in November, 1906, he presented symmetrical, hard, painless swelling of both sides of the face, which broadened the alveolar processes, filled the canine fossæ, and pressed downwards the right half of the hard palate. The teeth were somewhat displaced and the permanent canines had erupted in front of the temporary canine teeth. The outer wall of the nose bulged inwards so as to press on the septum on each side, almost completely obstructing the nares. There was a rather profuse muco-purulent nasal discharge, and also epiphora and lachrymation. Ocular movements were normal, vision in the right eye was good, but had always been defective in the left. On trans-illumination the entire face was dark. The swelling on the right side was explored through the canine fossa and was found to consist entirely of soft bone, the antrum being absent. This bone, on microscopical examination by Dr. F. G. Bushnell, was reported to show spindle-cell osteo-sarcoma. Since November, 1906, there has been very little change in the condition.

DISCUSSION.

Mr. DE SANTI said the microscopical sections were very interesting, and clearly showed a sarcomatous element. On the other hand, the history, symmetry, and appearance of the disease made one regard it as innocent. He doubted whether, clinically, it was sarcoma. He believed the disease to be diffuse osteoma or diffuse osseous growth which occurred, although infrequently, in young people and ran an innocent course. Under present circumstances he thought no operation should be contemplated. A contraindication for operation in such a case, if sarcomatous, would be displacement of the eye. If the eye were displaced outwards or upwards it indicated that the ethmoidal region was affected or (when displaced inwards) that the spheno-maxillary fossa was invaded. The prognosis in the event of removal of the upper jaw was then very bad.

Dr. JOBSON HORNE agreed with the previous speakers that Mr. Hutchison had brought forward a case of exceptional interest and importance. It had been regarded as sarcoma, and in the present state of knowledge of sarcoma Dr. Horne thought that exception could not be taken to that diagnosis. Sarcoma, as Dr. Horne had pointed out elsewhere, was a term used to cover a multitude of conditions, the exact nature of which was not understood. The history of the present case, the symmetry of the growths, led him to the opinion that the condition was not sarcoma in the sense that it would give rise to metastases and cause the boy's death, but that it would remain local and continue to grow. The case reminded him of a skull preserved in the museum of St. Thomas's Hospital. It presented a pair of symmetrical growths which during life doubtless occasioned a facial appearance resembling, but in a more marked degree, the case that had been exhibited. Dr. Horne believed that the present case had been brought about by some intranasal infection, the precise nature of which it might be difficult to ascertain, but the results of intranasal infection still afforded a field for research. He was in favour of leaving the present condition alone, though he believed the patient would grow up to be very ugly.

Dr. L. H. PEGLER asked whether Mr. Hutchison would allow the Morbid Growths Committee to report upon the slide. It was not easy to pass an expert opinion on a slide only seen for a few moments. The cells in this case were those usually associated with a spindle-cell sarcoma, and if a different interpretation were adopted it would be necessary to revise half our catalogues and re-label numberless microscopical sections.

Dr. SCANES SPICER said he had had several patients whose antra he had cleared out, the contents of which antra had been condemned by pathologists as sarcoma, but their owners were walking about well ten years afterwards. Therefore he was sure the histological diagnosis in these cases often should be accepted with some caution. As Dr. Horne mentioned, the diagnosis of "sarcoma" was by no means an explanation of the process giving rise to it. From the clinical look of this case he did not believe it was "sarcoma" in the ordinary sense, *i.e.*, capacity of giving rise to metastatic growths of the same structure.

Dr. WESTMACOTT endorsed the remarks of Dr. Scanes Spicer concerning the pathological examination of tissue removed from the upper jaw. Early this year he suggested to Dr. Smurthwaite the drawing up of a list of cases. He had recently experienced three different cases in which malignancy was described in tissue removed from the jaw, but in each case it was proved to be innocent. He regarded the present case as allied to leontiasis, not sarcoma in any form. Against the latter was the history, its appearance, the absolute symmetry, the absence of crepitus. Moreover, the teeth were all present on both sides, therefore there seemed to be no irritating cause.

Dr. FITZGERALD POWELL agreed that there seemed to be clinically no sign of sarcoma, and he believed it was probably leontiasis ossium. With regard to treatment he thought the cause was probably either tubercle or specific disease in the first place. He would advise the administration of iodides.

Dr. H. SMURTHWAITE said that about two years ago he had a similar case, on one side only. The whole front of the maxilla was pushed forward, but there was no protrusion of the eye. The hard palate was forced into the mouth. He could not see any growth in the nose, but the inferior turbinal was pressing tightly on the septum. A general surgeon saw the case with him, and although that gentleman would not say it was sarcoma it was decided to put the patient under chloroform and open the antrum. He removed the anterior portion of the inferior turbinal and came upon a large, smooth, dry cavity. The child was aged 5. The maxilla was very much thickened, and now, two years later, the child was still alive. He believed the present case was one of leontiasis ossium.

Mr. A. L. WHITEHEAD said that one case of the kind he saw had symmetrical growths in the upper and lower jaw, and in another case he had had the condition under continual observation eleven years. The present appearance was identical with that of the patient shown, though she had a larger face and head. Still, the growths had only increased in proportion to the face. In regard to the value of the pathologist's report in cases of sarcoma, he thought the pathologist deserved commiseration, because if a section were supplied him consisting of spindle-cells of that character he had no alternative but to describe it as sarcoma, even though, clinically, it was not sarcoma.

Mr. HUTCHISON, in reply, agreed to refer the case to the Morbid Growths Committee, and thanked members for their suggestions as to treatment. His diagnosis of sarcoma was entirely founded on the pathologist's report. That gentleman said it was typical spindle-celled sarcoma, and therefore Mr. Hutchison felt bound to call it so.

A Case of Laryngeal Ulceration.

By P. WATSON WILLIAMS, M.D.

THE patient is a gardener, aged 24. The voice began to get husky three years ago, gradually becoming worse, and it is now quite hoarse. There is no pain, but recently some slight soreness in the laryngeal region. He has been married for three years and has three very healthy children. There is no expectoration nor any sign of pulmonary disease. The left vocal cord is practically immovable; it is covered in its entirety by the swollen ventricular band, along the free margin of which is a fairly circumscribed fringe with a circular shallow ulcer. There is some fulness externally on the left side, at a site corresponding with the cricoid cartilage. The movements of the right cord are unimpaired.

DISCUSSION.

Sir FELIX SEMON said it was excessively difficult to form an opinion on the case. There was complete immobility of the whole of the left half of the larynx, so complete that if there were not, at the same time, swelling, one would believe that there was paralysis of that side. But on account of the youth of the patient, the ulceration and the swelling, one was driven to the belief that, in all probability, there was some mechanical impairment present.

Mr. BARWELL said that after Sir Felix Semon's remarks he would not venture to give a definite opinion, but the appearance certainly made one think of tuberculosis. It had occurred to him that the patient might have pressure on the recurrent laryngeal nerve from tuberculosis of the glands about the bronchi and a tuberculous ulcer in his larynx. That would explain the peculiar appearance of this case.

Dr. SMURTHWAITE asked whether Dr. Williams would show the case a year hence. He was constantly having such cases before him, and was anxious to know the later results. Much was to be learnt from such cases being brought up again. An opinion might be formed which might turn out to be wrong in a few months' time.

Dr. WATSON WILLIAMS, in reply, said he only saw the case for the first time fifteen days ago, and had seen it once since nearly a week ago. The man had been on 20 gr. of iodide of potassium for three weeks. He was sent by Dr. Taylor, of Chippenham. He hoped to be able to bring him up again in some months' time. He regretted no one had thrown any further light on the case. Some features made him think it might be tuberculous, but others seemed to negative that.

A Patient in whom a small Fibroma had been removed from the Left Vocal Cord.

(With Microscopical Specimen.)

By CYRIL HORSFORD, F.R.C.S.

THE patient, a female, aged 38, was an amateur vocalist. She had had complete loss of singing voice and increasing huskiness for eighteen months. The fibroma was removed from the middle of the upper surface of the left vocal cord on October 11, 1907. The voice is now good, both on singing and speaking.

A (?) New Instrument devised to facilitate Intralaryngeal Operations.

By CYRIL HORSFORD, F.R.C.S.

THE instrument, which was employed in the case described above, consisted of a specially constructed needle-holder, designed to pass a curved needle through the epiglottis and so to lift up the organ by means of a suture.

DISCUSSION.

Mr. STUART-LOW said he saw the fibroma removed, and felt sure that the instrument shown facilitated the removal very much. He could not get a view of the fibroma, though he tried repeatedly, but after the instrument was used and the ligature had been passed it was easily visible. The removal was carried out with great skill, ease and with no discomfort to the patient, and he believed the method was a distinct advance and would prove a great help to the surgeon.

Mr. DE SANTI thought there must be very few cases in which it was necessary to use such an instrument. The patient would have to be educated up to it before it could be easily used. He regarded it as somewhat unnecessary.

Dr. STCLAIR THOMSON said the instrument was ingenious and might be useful in some cases. It seemed to approximate the edges of the epiglottis towards one another, but Mr. Horsford said that the epiglottis was incurved, and that was why he passed a suture through it. The epiglottis was remarkably tolerant of interference, as was found in treating it for tuberculosis. Those who were brought up on the use of the Mackenzie forceps knew that even in the case of fibromata which were very anterior, once the Mackenzie forceps were got over the edge of the epiglottis the latter could be pulled forward so that the growth could be seen better when operating. But the present method was evidently painless, and might be useful in rare cases, where the anterior commissure required to be dealt with.

Sir FELIX SEMON said that Mr. Horsford justly put an interrogation mark with the word "new." The method was really more than thirty years old. He had seen a similar instrument illustrated, and if possible next time he would bring the illustration.

Mr. WAGGETT thought that the Section owed Mr. Horsford credit for the instrument, but it should not be forgotten that the instrument of Escat did the same thing without disturbance of the patient.

Mr. HORSFORD, in reply, said he first tried the method one year and a half ago on a case in which it was absolutely necessary to get a complete view of the interior of the larynx. He was excising a fibrous web, and as he was using a sharp Heryng's knife it was necessary to see what he was doing. In the present case he agreed with Dr. Thomson that the shank of the Mackenzie forceps, when removing the fibroma, might be used for holding the epiglottis forward, but the growth was so difficult to see before attempting removal that he felt it necessary to do something to obtain a better view. Having done so he felt he could dodge the light by putting the shank of the instrument in other positions than against the epiglottis so as to see clearly the point of the instrument and do the operation without damaging the vocal cords. That was very important as the patient was a singer. He recommended the method because it was neither difficult nor painful. The patient had to be prepared in the ordinary way with cocaine, and much of the success depended on the efficient preparation, both local and general. The method was new as far as he was concerned, and he put the query mark because the idea was so obvious that it had possibly been thought of by others.

Bilateral Frontal Sinusitis after Operation.

By CHICHELE NOURSE, F.R.C.S.

THE patient, a woman, aged 27, was first seen thirteen months ago complaining of frontal headaches, nasal obstruction and purulent discharge, which had existed for several years. Both nares were full of polypi, which were removed. Both antra were punctured and washed out through the nose and were found to contain fœtid pus. Both frontal sinuses were explored by a cannula passed up the infundibulum; much pus was found in the right sinus and a smaller quantity in the left. This treatment was repeated each week for three or four times, after which the pus from the antra was no longer offensive, but the discharge from the frontal sinuses was undiminished. Both sinuses were operated on by the Ogston-Luc method on October 24; both sinuses were very large and the septum between them had almost disappeared. The wound was completely closed and healed by first intention. The right antrum was again punctured six days later. The patient is now well.

DISCUSSION.

Mr. BARWELL asked why Mr. Nourse had made the scar across the bridge of the nose, and whether that was essential for getting at the sinuses. He suggested that it might have been done on both sides by two separate incisions along the eyebrows.

Dr. SCANES SPICER said he had been struck by the good result in this case, especially the free space between the septum and outer wall of the nose. He had himself sometimes found difficulty in getting that, and thought the secret of success in frontal sinus operations depended largely on good clearance of the anterior ethmoidal cells and the front half of the middle turbinal.

Mr. NOURSE, in reply, said he preferred to carry the incision completely across, so as to get at both sinuses with ease and with the shortest possible incision. The septum between the two sinuses had almost entirely disappeared, so that the sinuses formed one cavity.

Two Cases from which a Bleeding Polypus of the Septum had been removed.

(With Microscopical Specimens.)

By C. A. PARKER, F.R.C.S., and L. H. PEGLER, M.D.

CASE I.

THE patient was a woman, aged 33. There was a perforation in the cartilaginous septum, the result of rhinitis sicca or a perforating ulcer, and the growth sprang from the upper margin of the perforation by a small attachment. It was about the size of a small cherry and protruded into both nostrils, causing partial nasal obstruction. The patient had suffered from obstruction and occasional epistaxis for about fourteen years. Examination now showed dryness of the mucosa with a crust adhering to the superoposterior margin of the perforation, covering the site of attachment of the growth. There is no sign of recurrence eight months after removal.

The microscopical section shows:—

(a) *Covering or Envelope.*—Fibrinous exudate and blood-clot replacing columnar ciliated, transitional and squamous epithelium, the latter dwindling away in parts to a one-celled layer.

(b) *Beneath the Envelope.*—A submarginal granulomatous zone with fibroblasts, leucocytes and lymphocytes.

(c) *Body of the Growth.*—(1) Vessels and blood-spaces, many of a large size. (2) Cellulo-vascular masses, sometimes forming a meshwork, distributed in a looser connective tissue stroma. The constituent endothelioid cells tend to aggregate around the vessels.

The transverse section is seen to be roughly mapped out in this way, and some of the masses come close under the margin.

CASE II.

The growth—about the size and shape of a bean—was growing from the right side of septum in Kiesselbach's area, and, although lying flat against the septum, the actual attachment was not more than $\frac{1}{6}$ in. in diameter. The patient had had very severe attacks of epistaxis for six weeks, and was ill and exhausted. Ten years previously she had been treated for dry rhinitis and a threatened perforation of the septum. For the last two years she has again blown crusts from her nose. Examination at the present time, two months since removal, shows that a recurrence is taking place.

The microscopical section shows:—

(a) *Covering or Envelope.*—Epithelium almost entirely denuded and replaced in part by fibrinous exudate, suspending leucocytes.

(b) *Beneath the Envelope.*—A submarginal granulomatous zone, in which are many spaces crowded with lymphocytes.

(c) *Body of the Growth.*—(1) Numberless vessels and blood-spaces of all sizes and shapes, but mostly moderate in dimensions. (2) The intervening substance is chiefly a fibro-angeiomatous meshwork of cells and small vessels or capillaries, sometimes submarginal, with a few areas of looser and less cellular tissue. In this case the endothelioid cells approach a maturer and more stellate form than in Case I. and lymphocytes are everywhere dotted about.

Note.—From the clinical point of view both these cases support the position taken up by Liebermann, Ribary, Krieg and others, namely, that bleeding polypus of the septum is intimately connected with rhinitis sicca and bleeding vessels in Kiesselbach's area.

DISCUSSION.

Dr. PEGLER said that the interest of these two cases rested on the fact that in each one there was distinct evidence of rhinitis sicca, and in one case the process had gone on to ulceration, destroying the triangular cartilage. Of more than 20 cases in which the clinical history and pathology were known to him, these were the first in which any observation had been made of co-existent disease of the mucous membrane of the nose. In the recrudescence now taking place in one of them, he advised Mr. Parker, in operating, to take away the septal cartilage at the base; no harm could result, there need be no perforation, and one might gain a true idea of the basal tissues. The pathological reports which he had made were in Mr. Parker's hands.

Dr. StCLAIR THOMSON asked what was the microscopic report of the case which recurred. A study of the cases shown by members indicated that recurrence need not necessarily alarm the clinician, because in the first case of the kind he had shown, eight or nine years ago, very free recurrence occurred, and many members then advised removal of the whole septum, first, because it was suggestive of sarcoma, and secondly, because of the rapid recurrence and the fungating appearance. His own case which recurred was found to be an innocent angeioma of the septum.

Dr. JOBSON HORNE referred to Dr. Pegler's suggestion that a portion of the septum of the nose should be removed with the growth to assist them in ascertaining the nature of the latter, and also to Dr. Pegler's statement that this had been done in a previous case, but that the specimen unfortunately had been lost. Dr. Horne inquired whether Dr. Pegler seriously suggested the removal of a portion of the septum merely to satisfy histological curiosity.

Dr. PEGLER rejoined that he had suggested no destruction of the septum, only that instead of snaring through the pedicle it was better to remove the portion of cartilaginous tissue from which the growth arose. In that way recrudescence was prevented. He did not call it recurrence, because that was a term only applicable to the results of the infiltration of malignant disease. They must either cauterise a hole in the cartilage or remove the piece with a suitable knife, as did many of their foreign confrères, the latter method being the more surgical and absolutely curative.

Dr. JOBSON HORNE thought that the tendency of the discussion had been to make a mountain out of a molehill in regard to bleeding polypus of the septum. Some ten years or more ago he brought forward one of the first, if not the very first, of such cases which were recorded in the *Proceedings of the Laryngological Society of London*.[1] Since then he had seen many such cases and had come to regard them as quite innocent, easily cured, and of little or no importance. To remove a portion of the nasal septum because a little piece of embryonic tissue which sprang from it occasionally gave rise to bleeding, which could be entirely stopped in other ways, seemed to be a too surgical procedure. He thought that such treatment was out of all proportion to the innocence of the pimple.

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[1] *Proc. Laryngol. Soc. Lond.*, 1896, iv., p. 31.

Mr. Clayton Fox asked whether it had occurred to Dr. Pegler that Jacobson's organ came into the matter at all. That organ in the adult was represented by a cul-de-sac, which was capable of receiving microbes, and the inflammation and the granulation tissue might possibly produce such tumours. Potiquet states that a favourite area for growths and perforations corresponds to the position of the vestige of Jacobson's organ in the septum.

Dr. Pegler, in reply, said there was no embryological significance to be attached to it, and it was associated with the distribution of Kiesselbach's artery and had nothing to do with Jacobson's organ, which was situated further back and at a lower level.

The President, in regard to the association with rhinitis sicca, said that in Case II. there was some rhinitis sicca on both sides of the septum, but the dry crusting which was seen on the same side as the growth was situated much further back than the growth. The growth seemed quite independent of the rhinitis sicca.

Mr. Parker, in reply, said he showed the cases from an etiological point of view, and not to exaggerate their seriousness. Dr. Horne referred to a pimple, but in Case II. the growth was the size of a big filbert nut, flat on one surface, convex on the other. He proposed to remove the growth again and apply either the cautery or pure nitrate of silver to the point of attachment.

A Patient in whom an Œdematous Fibroma had been removed from the Left Vocal Cord.

Shown by L. H. Pegler, M.D.

This patient, a female, was exhibited at the meeting of the Section in November, 1907 (*see* p. 8), and was now brought up again to show the condition after removal of the growth.

Dr. Pegler remarked upon the condition of the left vocal cord. If the growth had been entirely superficial to the surface of the cord as in Dr. Watson Williams's case, why was not the cord as white and flat as that on the right side? It was obvious that, although rapidly recovering itself, it had all the appearance of a cord that had recently been the seat of an operation such as had been performed.

Case of Epithelioma of the Left Tonsil, Faucial Pillar and Uvula.

By Dundas Grant, M.D.

The patient, a man, aged 52, had been conscious of gradually increasing discomfort in his throat for ten months, but no definite pain. On examination there was found to be a large area of ulceration occupying the whole of the left tonsil and adjacent portion of the anterior pillar, and extending superficially over the left half of the soft palate and the anterior surface of the uvula. The edges were scarcely everted, and the induration to touch was somewhat less than is usual in case of epithelioma. A microscopical examination revealed typical epitheliomatous structure, although previous examinations were reported to have been negative. Recently a hard gland had developed high up under the sterno-mastoid, and close to the mastoid process. The question arose as to the operability of the case.

DISCUSSION.

Mr. NOURSE said that Dr. Grant had been obliged to leave, but wished for opinions as to the operability of the first case, that of epithelioma of the tonsil.

Mr. BARWELL said the glands were affected on both sides of the neck, apparently very deeply. He thought the primary disease was quite operable, but he doubted if the surgeon would be able to deal thoroughly with all the glands which were secondarily involved.

Case of Chronic Suppuration of the Maxillary Antrum treated by Operation through the Inferior Meatus.

By DUNDAS GRANT, M.D.

THE patient was a female, aged 20, suffering from chronic suppuration of the maxillary antrum with pain in the frontal region, causing a suspicion that there might be frontal sinus disease. Opening through the canine fossa was contraindicated on account of the excellent state of preservation of the teeth. The anterior part of the middle turbinal was removed, and the frontal sinus washed out with negative result. The antrum was treated by operation through the inferior meatus by perforation with a conical burr, and subsequent enlargement of the opening by means of Onodi's punch forceps, a portion of the inferior turbinal having been previously removed. The patient has been able to wash out the antrum through the artificial opening, and has for a considerable time been free from purulent discharge or pain.

DISCUSSION.

Mr. HERBERT TILLEY thought it would be well if the patient could be shown again six months hence, after she had possibly caught one or two colds. His experience of a few such cases was that they did very well for six weeks to two months, then got a cold, and that portion of the inferior turbinal which was left over the naso-antral opening impeded free drainage and induced a catarrhal condition of the antrum, which was practically as bad as the original trouble.

Three months ago he had an experience of this kind, in a case which had been operated on two years ago in Germany by the intranasal method. The cure was hampered by the inferior turbinal which remained, although it was quite easy to pass a probe into the antrum. The inner wall had been removed. The patient suffered from excessive muco-purulent discharge which was only cured by removing the anterior half of the inferior turbinal, so that the antral cavity was in free communication with the nasal cavity.

Dr. WATSON WILLIAMS said most of the members must have considered the question as to whether it was better to enter the antrum through the nose or through the canine fossa. The nasal route operation reminded him of the horse with two faults: first, it was difficult to catch, secondly, it was not much good when it was caught. The greatest advantage of operating from the outside, to put it briefly, was that the surgeon could look before leaping. It enabled the operator, by direct examination, to determine how far the antral mucosa was diseased, whether it was necessary to remove it by curetting or whether the region of the unciform process was so diseased as to demand removal, &c. But in going through the nose, one could not possibly get a proper inspection of every part of the antrum; thus, unless more than sometimes was really necessary was removed, one ran the risk of leaving pathogenic areas which would subsequently cause trouble, and perhaps necessitate a further operation in a large proportion of cases.

Mr. PARKER said that he had performed this operation for the last two or three years, and since taking to it he had not once done the operation through the canine fossa. He believed it to be absolutely successful and much simpler than the canine operation. Success depended on making a big opening through the inferior meatus into the antrum and in removing as much of the bone as possible. Through such an opening it was generally possible to introduce the little finger and determine the condition of the antral walls. When healing was complete the opening would be found to have contracted to half the original size, but this was sufficient for the purposes of drainage and irrigation, and it was generally possible to teach the patient to wash the antrum out for himself. In every case the anterior end of the inferior turbinal should be removed, otherwise there were difficulties in the patient washing out the antrum. Suppuration usually ceased in from ten days to a fortnight, and there was no trouble from resulting catarrh in his experience. He believed that nearly all cases of antral suppuration could be cured by this simple operation.

Dr. WESTMACOTT said he did not see how one could decide on general principles what operation was suitable for the whole mass of antral suppuration; each case should be treated according to the anatomical condition found. To remove the internal wall from the inferior meatus, where there was a considerable depth below the floor of the nose, was courting disaster by not providing efficient drainage. In an edentulous jaw in an old person, in whom the floor of the nose was on a level with the floor of the antrum, the inferior meatus was the most favourable situation to operate through. The inferior turbinal should be removed through the whole of its extent. The internal wall of the antrum and the anterior part of it being more bony than the posterior half of the antral wall in that situation, it was not only easier but better to have the opening the whole length and pack it from there. If there were a fairly deep alveolus in normal cases the floor of the antrum was below that level, and if the teeth were present the best course was to remove the tooth and go up through the socket of it and make a reasonably large opening into the antrum. Then one should put on a plate of vulcanite, either clipped on to the next tooth or in some other way, and remove it each time for washing through. For the more radical operations one had the option of going through the outer wall of the alveolus, and an opening could be made into the canine fossa for inspection or for clearing out the antrum.

Dr. StClair Thomson said the question wanted reopening, and thought there should be a formal debate on it. There had been a boom recently in the antral operation entirely through the nose. He had not tried it, and was not yet converted to it. He had opened the maxillary sinus which had been operated upon by that method and reported cured. The case had a magnificent opening from the antrum into the nose so that one could pass one's little finger in. But the nose had a quantity of loose pus in it, and all the lining was polypoid. Another advantage of opening up from the canine fossa was the excellent opportunity it gave for exploring and treating the ethmoid. When he did the operation he also opened the middle meatus and removed a large quantity of the ethmoid, which nearly always in these cases called for treatment. It would be a great advantage if some such cases could be shown, the patients being asked to refrain from washing the nose out forty-eight hours before coming.

The President said he agreed that the question required reopening. He still adhered to the Caldwell-Luc operation. He had known many operations suggested for curing antral suppuration during the last twenty years, and each of them had in due course gone out of fashion. He was satisfied with the canine fossa opening, as it alone gave the opportunity of inspecting and exploring as well as treating the antrum, and it was not a severe operation. A few days ago he had a case which had been operated upon a year previously at another hospital by the new method. The nasal opening into the antrum, though large, was somewhat covered by the inferior turbinal. He did not think enough of the turbinal had been removed. The patient's statement was that she was better for a time, but at intervals of every month or two she had a purulent discharge. He opened through the canine fossa, and found an unhealthy condition of the mucous membrane in the antrum, and he also came across a thin plate of necrosed bone, which he thought had been pushed in from the nasal wall at the previous operation, and had remained in the cavity. He made a larger opening into the nose, and he thought the patient would remain well.

Laryngological Section.

January 3, 1908.

Dr. J. Barry Ball, President of the Section, in the Chair.

A Case of Bleeding Polypus of the Nose.

By W. H. Kelson, M.D.

The patient, a woman, aged 20, had suffered from epistaxis from the right nostril for four months, and had noticed a swelling just inside the nostril for three months. The growth was rounded, about the size of a pea, and was attached to the floor of the nose just below the anterior extremity of the right inferior turbinated body.

Dr. **Kelson** said that he intended to remove the polypus. He reminded members that in 1903 he showed a case of the same kind, the polypus arising from exactly the same spot. In 1904 Dr. StClair Thomson showed two cases of bleeding polypus of the septum, and gave a short résumé of the subject, and at that time he would not admit that Dr. Kelson's case belonged to the same group. Had he been now present he would have liked to hear whether Dr. Thomson had altered his views.

A Case of Ulceration and Destruction of the Epiglottis.

By W. Jobson Horne, M.D.

The patient, a man, aged 43, had experienced dysphagia since the middle of November last; at the end of that month it became worse. The voice had not been affected. When the patient was first seen there were swelling and thickening of the epiglottis, more particularly along the free border, extending along the ary-epiglottic fold on to the pharynx on the right side. The epiglottis partly obscured the larynx; the latter, so far as could be seen, appeared to be normal, and the vocal cords moved equally and well. Lues was denied. The patient improved for a while under iodide of potassium; mercury more recently had been added. The epiglottis had ulcerated and broken down, and a deep-seated gland was palpable close to the larynx on the right side. The case was shown to elicit opinions whether it were operable.

DISCUSSION.

Dr. H. J. DAVIS said he felt no doubt that it was carcinoma.

Mr. CRESSWELL BABER believed it to be malignant.

Mr. BARWELL said there was a firm, deep gland on the right side, under the jaw, and some ulceration extending on to the pharyngeal wall. There could be little doubt that it was malignant.

Sir FELIX SEMON said that, if malignant, it should be removed without delay, but he did not see why a small piece should not be first removed and microscopically examined, as that could be easily done. In the event of its being found invaded by malignant disease, and radical operation being decided upon, this should, he thought, include taking away also the cervical lymphatics on both sides as a prophylactic measure.

Dr. FITZGERALD POWELL said he thought the lateral wall of the pharynx was also invaded, probably by contact, and therefore the operation should include a portion of the pharynx.

Mr. WAGGETT said he thought there was too great a tendency in this country to call such cases inoperable. The technique was not difficult; the most important point was that concerning the stamina of the patient. He had recently seen some of Gluck's work, and had been convinced of the practicability of removing even a large piece of the pharynx and œsophagus as well as the larynx. That surgeon had had some excellent results to show.

Dr. WILLIAM HILL said he thought it was a question whether removing the epiglottis and bits of the pharynx was enough in such a case. The more he saw of cancer of that region the more he was inclined, except when very limited in the vocal cord area, to advise removal of the whole larynx. After partial laryngectomy he had seen so many cases of recurrence or, perhaps, rather continuity of growth.

Dr. JOBSON HORNE, in reply, expressed his thanks for the opinions offered. His wish had been to hear views as to the advisability of an operation, his own view being that it was probably malignant.

A Case of Fibrous Constriction of the Trachea.

By HERBERT TILLEY, F.R.C.S.

THE patient, a man, aged 34, who had been previously shown before the Laryngological Society of London, presented an eccentric fibrous constriction of the trachea about the level of the fifth or sixth tracheal ring. It was probably due to cicatrisation of tertiary syphilitic ulceration. The constriction can only be seen when the observer is below the level of the patient's chest and the latter leans slightly forwards. At times there is considerable dyspnœa, but the patient has improved under antisyphilitic treatment, and is now comparatively comfortable.

DISCUSSION.

The PRESIDENT said he did not understand whether the condition was similar to that when he was seen about a year ago, and, if so, whether he had improved under iodides on that occasion.

Mr. HERBERT TILLEY, in reply, said the condition now was almost identical with that a year ago. There had been inunctions of mercury. The condition seemed to be the same to the observer, but the patient thought he had more difficulty in breathing, and attended the hospital on that account. He was now more comfortable again, and it seemed better to leave the condition alone so long as there was no risk in doing so. There had been no history of tracheal trouble or anything to indicate ulceration in that region. The man first attended Golden Square Hospital because of difficulty of breathing on exertion. On being kept quiet in bed the extreme difficulty passed off, and as time went on he got better under the mercury inunctions and the administration of iodides. If he were examined in the ordinary position for laryngoscopic examination nothing was seen, but if he were asked to stand up with the head and shoulders slightly bent forwards, and the observer knelt in front and below him, the tracheal constriction would be visible. There was a tendency to neglect this method of examination of the trachea, and it was one of the reasons prompting him to show the case.

Case of Chronic Empyema of Left Frontal Sinus operated upon two years ago by a simplified method of Killian's Operation.

By HERBERT TILLEY, F.R.C.S.

THE patient is a man, aged 53; the wound was sutured at the close of the operation and the floor of the sinus was not removed, otherwise the ordinary Killian operation was performed.

DISCUSSION.

Dr. WILLIAM HILL asked what the modification consisted of.

Mr. STUART-LOW said he also would like to hear in what the modification consisted. He was struck with the good result from the æsthetic point of view, but there was very little evidence of the ascending process of the superior maxilla having been removed. The bone above, where the front of the sinus was operated upon, had not been regenerated to anything like the same extent as the bone over the ascending process of the maxilla. From the subjective point of view he took exception to the operation as the man had now much pain. That pain was not neurotic: it occurred at the site of the operation, and he thought it was due to the supra-orbital nerve having been partially or completely divided, but no portion excised. In cases where there was neuralgia Killian was now careful to remove an inch of the supra-orbital nerve. If the nerve was injured it underwent fibromatous change, and regeneration took place by fibrillæ pushing their way into the fibrous tissue. In answer to questions, the patient said he had no pain elsewhere except in the region of that nerve, and this was increased on pressure. Mr. Stuart-Low therefore counselled removal of a portion of nerve in all cases at the time of operation, and in this particular case to remove the cause of the pain.

Mr. BARWELL said he thought one reason why Mr. Tilley showed the case was to exhibit the result of immediate suture of the wound. That, he (Mr. Barwell) thought, marked a considerable advance in the treatment of those cases, provided the opening into the nose was sufficiently free. He did not think there was then much risk in suturing the skin over the wound at once; there was good healing, and it saved considerable trouble and pain. He had himself done it for some time in most of his cases, and he regarded the results as very good.

Dr. FITZGERALD POWELL wished to congratulate Mr. Tilley on the result in this case, more particularly the æsthetic effect. He thought he saw some pus in the nose, but the quantity must have been very small. In reference to Mr. Barwell's remarks, Dr. Powell did not think it was a safe proceeding, nor did he think it was the general opinion that it was safe, to sew up all such cases at once. He should like to know whether Mr. Tilley advocated the closing of the wound in all cases of frontal sinus operation.

Mr. HERBERT TILLEY, in reply, agreed that the term "modified Killian" was a little misleading, and the suggestion of Dr. Grant that it should be called "an incomplete Killian's operation" was a good one. Killian removed the floor of the sinus, but in the present case he (Mr. Tilley) did not do so. If the sinus was of any depth (from before backwards) he always took away the floor. In answer to Mr. Stuart-Low, the usual curved incision suggested by Killian was made, and he could assure him there was a large opening made in the ascending process of the superior maxillary bone, although it was not completely taken away. He preserved the periosteum, and in putting it back probably it had been possible for fibrous and bony growth to develop and close the lower opening; the operation was done two years ago. With regard to the neuralgic condition, if he had had experience of that in a number of cases he would think more of it in this particular patient, but the latter had constantly something of this sort to complain of, and seemed rather an "old soldier" in the matter. In answer to Mr. Barwell, he would not close the wound at once in every frontal sinus case. If there were a frontal sinus suppuration which could not be cured by intranasal means a large opening might be made, and if there were no source of infection left the wound might be closed. But if one were not sure in this matter it would be wiser to leave it open for a week or ten days, waiting for a healthy granulating surface before closing. He once risked immediate closure in a case complicated by extensive ethmoidal disease and the patient got osteomyelitis of the frontal bone and died. The appropriate treatment of individual cases must be carefully selected.

Preparations illustrating Diseases of the Trachea.

By W. Jobson Horne, M.D.

(*a*) A macroscopic preparation of a trachea laid open to show a pedunculated papilloma springing from the anterior wall near the bifurcation. A microscopic section of the adjacent lymphatic gland was also exhibited.

(*b*) A microscopic section cut horizontally through the trachea of a child, showing a sessile papilloma attached to the anterior wall.

(*c*) A microscopic preparation of a section cut horizontally through a ring of the trachea of a woman, aged 20 (married; one child; no miscarriage), and who for two and a half years had suffered from a very bad throat. She had extreme dyspnœa, and died suddenly before tracheotomy could be performed. The glottis was narrowed and the interior of the larynx, which was studded with closely set papillomatous-like excrescences, presented the appearance of pachydermia syphilitica diffusa. This extended down the trachea. Under the microscope there was no ulceration or loss of substance, but a heaping-up of the epithelium, with a metaplasia of the cells from the cylindrical to the squamous variety; immediately beneath the epithelium there was an abundant small round-cell proliferation.

(*d*) A microscopic section cut horizontally through an entire membranous cast of a child's trachea from a case of diphtheria. The section presented a complete ring, so that the outer or detached surface was readily distinguished from the inner or superficial layer. In the latter were to be seen clumps of diphtheria bacilli, becoming fewer towards the deeper layers. The specimen illustrated that the membrane is less adherent in the trachea than in the fauces, due to the difference in the epithelium lining the two regions. The specimen showed well the structure of a diphtheria membrane in this region, and also the distribution of bacilli in it.

DISCUSSION.

Dr. H. J. DAVIS asked why the microscopical section of the adjacent lymphatic gland was shown, also, whether the papilloma was a simple one.

Mr. HERBERT TILLEY asked whether the papilloma situated near the bifurcation was causing any symptoms. If so, it would have been an excellent case for dealing with by the direct method through Killian's tubes.

Dr. JOBSON HORNE, in reply, said the gland adjacent to the growth in the first specimen was found enlarged, and was microscoped to ascertain whether it threw any light on the case. So far as he knew it showed nothing beyond what was commonly found in such glands. The specimen was met with accidentally in the post-mortem room, and so, presumably, it gave rise to no symptoms during life. The series of specimens had been exhibited in view of the increasing attention now being paid to the trachea, owing to direct examination being more frequently practised, and therefore it was well to pay more attention to the pathology of the conditions found in that region.

Case of Lipoma or Cystoma of the Neck.

By W. JOBSON HORNE, M.D.

THE patient, a coal porter, aged 37, had noticed a lump on the right side of the neck along the anterior border of the sterno-mastoid for twenty years. At first it was no larger than a small pea; it gradually increased to the size of a small hen's egg. Dr. Horne showed the case for opinions prior to its removal; he was inclined to regard it as a lipoma.

DISCUSSION.

Dr. H. J. DAVIS considered it to be either a lipoma or a cyst.

Dr. DONELAN said he thought it was a cyst. He had a similar case a year or two ago, and when opened he found it contained gelatinous fluid.

Mr. Clayton Fox said he had a very early opportunity of examining the case, and at first he thought the appearance was consistent with that of lipoma. But it now seemed to be distinctly beneath the deep fascia, and was evidently fluctuating. Though it was not in the usual position for a branchial cyst he thought it might be one, and possibly it arose in the third branchial cleft.

Case of Tumour of Right Thyroid Lobe.

By James Donelan, M.B.

The patient, a man, aged 50, had no symptoms until about nine weeks ago, but since then he had suffered from dysphagia and loss of voice. There was a hard mass in the site of the right thyroid lobe, which persisted after the use of mercurial inunctions and iodides. There was complete right recurrent paralysis and apparently paresis of the left tensors as well. He desired the opinion of the Section as to possible malignancy and whether any operation should be attempted.

DISCUSSION.

Dr. H. J. Davis said the right cord was fixed—it could not be adducted or abducted. He did not think that had anything to do with the enlargement of the thyroid on the right side. There was chronic inflammation of the larynx at the same time.

Sir Felix Semon said he had very little doubt that the thyroid enlargement was the cause of the immobility of the cord. There was obviously pressure on the pneumogastric or right recurrent laryngeal, and in consequence of that there was organic paralysis. Seeing that Dr. Donelan in the title of his communication had spoken of "adductor" paralysis, he (the speaker) wished to avail himself of the opportunity of earnestly asking gentlemen to be correct in their expressions concerning abductor and adductor paralysis. As soon as a case of organic disease was labelled "adductor" paralysis there was sure to be a new sensation and outcry that his (the speaker's) law had again been found wanting. One did not always get the opportunity, as in the present instance, of seeing that the case thus wrongly labelled was in reality a case of abductor or, possibly, already complete recurrent paralysis, as the cord stood not absolutely in, but only close to, the median line. Certainly it had been abductor paralysis and secondary contracture which had brought about the change of which Dr. Donelan spoke. At first, when gradual abductor paralysis of the vocal cord occurred, there was still some degree of abduction, then secondary contracture of the adductors came on, the cord was less and less abducted, and finally it became fixed in the middle line. This again, in turn, changed to the "cadaveric" position, when gradually *all* the fibres of the recurrent became disabled. This seemed what was just occurring in the present case. He could not convince himself of the presence of paralysis of the tensors of the left vocal cord. All he could see was a congested larynx and immobility of the right cord, with pachydermia of its processus vocalis. The appearance of the left vocal cord seemed to him to be of an inflammatory nature, not a nervous paralysis.

Dr. FitzGerald Powell said he was of opinion that the condition of abductor paralysis was due to pressure of the diseased mass on the recurrent laryngeal nerve. He certainly thought that the disease was a perichondritis of the thyroid cartilage, which appeared to be very much thickened, and not so much an affection of the thyroid gland. It was impossible to separate the mass from the thyroid cartilage. He thought the condition was due to syphilis.

Sir Felix Semon, answering Dr. FitzGerald Powell, said he had made it a special point to make the patient swallow, and when he did so the mass distinctly rose, as he convinced himself by palpation. So he had very little doubt that the mass was an enlargement of the thyroid gland.

The President said he noticed the point referred to by Sir Felix Semon. If he had looked at the case without being told anything, he would have supposed it was a complete paralysis of the right vocal cord, the cord being fixed in the cadaveric position, and he would have concluded that it was due to pressure by the tumour on the recurrent laryngeal nerve.

Dr. de Havilland Hall said he looked upon it as a case of complete paralysis of the recurrent laryngeal. There were lipomatous masses at the back of the neck, such as were often seen in alcoholics, and there was also pachydermia of the right processus vocalis, and that might also be of alcoholic origin.

Mr. Herbert Tilley said that as the mass seemed so hard he thought it would be well to have it radiographed. If proved to be a calcareous deposit in the thyroid, the indications as to the line of treatment would be more obvious.

Dr. Dundas Grant said it would be interesting to learn how long the man had had difficulty in swallowing. Though there was not complete fixation of the thyroid in swallowing, the diminution of mobility was very marked, and that was one of the signs of malignant disease. He had brought a case before the Society which exhibited nearly the same features, but in it the disease had probably commenced in the upper part of the œsophagus and had secondarily involved the thyroid gland.

Dr. Donelan, in reply, said he had at first described the paralysis as right recurrent, but it was suggested to him that it would be better to put it more definitely as adductor paralysis. When he saw the case previously the cords were abducted. During the use of iodide of potassium and mercury inunctions the cord had been approaching the middle line, and the sinuous outline of the left vocal cord had disappeared. The man had all along denied having had syphilis, and as at first the iodide and mercury caused little benefit he was seen by Mr. Cheatle. Just as chloroform was about to be given patient owned that he had had syphilis twenty years before. The iodide and mercury were then persisted in, and the symptoms steadily improved. The dysphagia, to which Dr. Grant had alluded, was his most marked symptom, and that was very likely due to extension of the growth between the thyroid, larynx and œsophagus. During the last week the dysphagia had been improving, and the case looked like one of gumma. The dysphagia had existed nine weeks and loss of voice six weeks, but he was now getting a fairly useful voice. The stony hardness of the thyroid still persisted, and suggested malignant disease. It was with a view to getting opinions as to whether, in that case, any operation was now advisable that he had shown the patient. He hoped to bring him to the next meeting.

Microscopic specimen from a Case of Ulceration of the Inferior Turbinated Body.

By Cresswell Baber, M.B.

The patient, a lady, aged 83, was seen on December 14, 1907, with a history of a blow on the nose from a marble mantelpiece four years previously, followed by a sense of fulness and a brown discharge from the right nostril. On examination a deep ulcer could be seen, occupying the anterior half of the right inferior turbinated body, which bled on being mopped with cotton wool. The posterior rhinoscopic view was normal; the palate was normal and the glands were not enlarged. On transillumination, both infra-orbital regions were dark.

On December 21 two small pieces were removed with a curette from the ulcerated surface, and the Clinical Research Association's report was: "A soft malignant growth of a carcinomatous type, but the tissues are much altered by inflammatory changes, and the character of the carcinoma is thereby rendered indistinct. There are no cell nests. It may have originated in the antrum."

A Note on Epiglottis Holders.

By Sir Felix Semon, K.C.V.O., M.D.

Sir Felix Semon, in accordance with a promise he had given at the last meeting, stated that he had since found that in a lecture delivered at the Vienna General Polyclinic, in the summer of 1878, on "Laryngoskopie und Rhinoskopie" by the late Professor Schnitzler, the latter had stated that after Victor von Bruns had constructed an epiglottis holder ("pincette"), Türck had designed an instrument by means of which a thread could be passed through the epiglottis, and that this again had been modified and simplified by Schroetter and Tobold. Türck's instrument was figured and described in his "Klinik der Kehlkopfkrankheiten," 1866, p. 552, and Sir Felix showed the illustration.

Laryngological Section.

February 7, 1908.

Dr. J. BARRY BALL, President of the Section, in the Chair.

Report of the Morbid Growths Committee.

MR. ARTHUR HUTCHISON'S specimen of bilateral swelling of the upper maxillæ (shown at the meeting of December 6, 1907, *see* p. 21): "The section has the microscopical appearances of a sarcoma; it consists chiefly of spindle-cells in interlacing bundles with a few large multinucleated cells interspersed."

A Case of Multiple Hereditary Developmental Angeiomata (Telangiectases) of the Skin and Mucous Membranes associated with Recurring Hæmorrhages.

By FREDERICK PARKES WEBER, M.D.

THIS case has been fully described in the *Lancet*, July 20, 1907, and was shown at the meeting of the Clinical Section of the Royal Society of Medicine on Friday, January 10, 1908. Special points of interest, apart from the changes on the external integument, are that there are small angeiomata over the tongue, the mucous membrane of the mouth, inside both nostrils, on the posterior wall of the pharynx, and on the anterior surfaces of the glottis, and that during the last six years the patient has been subject to very frequent epistaxis.

In this case treatment of the patient by calcium lactate has apparently failed to diminish the epistaxis. Local treatment by painting the nasal mucous membrane with a 1 per mille adrenalin solution seems to stop only slight attacks of the epistaxis. Recent continued arsenic and iron medication has, in spite of frequent epistaxis, almost entirely got rid of the troublesome anæmic condition with shortness of the breath, &c.

Besides the cases collected by Dr. Weber[1] and Professor Osler's recently published case, there exists the record of a case described by Chauffard[2] under the heading "Hæmophilia with Telangiectatic Stigmata." Chauffard's patient was a slightly anæmic woman, aged 50, who had suffered from recurrent hæmorrhages from the nostrils, mouth, and hairy scalp since she was aged 20. In her case there was no family history of any similar affection.

A Case of Multiple Telangiectases.

(*Shown at the Meeting of the Clinical Section on January* 10, 1908.)

By Sir FELIX SEMON, K.C.V.O., M.D.

(For SIDNEY PHILLIPS, M.D.)

THE patient is a married woman, aged 56, who has since childhood suffered from bleeding from the mouth, and more lately from the nose. Her father suffers from violent epistaxis and bleeding from the tongue. Her sister died from hæmorrhage of the gums. The patient has one daughter (also shown) who has vascular elevations on the tongue, and has recently had epistaxis. Near the tip of the tongue is a small red elevated patch, which at times spurts out blood freely; there is a smaller one on the surface of the tongue, and one speck behind an alveolus of the upper jaw, which also bleeds freely at times. In the right nostril there is a much enlarged vessel seen in the "locus Kiesselbachii"; on the left side some smaller red specks in the corresponding part of the septum; no lesions in the naso-pharynx or larynx.

Sketches of Three Patients with Multiple Telangiectases of the Skin and Mucous Membranes of the Nose and Throat.

By A. BROWN KELLY, M.D.

CASE I.[3]

WOMAN, aged 48. Epistaxis began in girlhood. "Spots" first noticed on cheeks when aged 29. Subsequently developed on ears, lips, fingers, hands and breast. Numerous small telangiectases on all visible parts of nasal mucous membrane; several on tongue. Patient died of syncope due to epistaxis. Patient's father was subject to epistaxis and had "spots" on face. Telangiectases began to appear on patient's daughter when aged 23.

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[1] *Lancet*, 1907, ii., p. 160.

[2] *Bull. de la Soc. méd. des hôp. de Paris*, 1896, xiii., p. 352.

[3] Case I. was fully reported in *Rev. héb. de laryngol.*, 1906, xxvii., p. 481, and in the *Glas. Med. Journ.*, 1906, lxv., p. 411.

CASE II.[1]

Woman, aged 41. Younger sister of Case I. Bleeding from lips and tongue began when aged 17. When aged 27 "spots" first appeared on skin of lower lip, and later on cheeks, fingers, scalp and forearm. A large telangiectasis is situated at tip of tongue, and a few others are scattered over dorsum. A group is present on palate. Over whole nasal mucous membrane are studded what look like small dusky red vesicles. Epistaxis is not so frequent or severe as bleeding from tongue and lips. Condition is slowly getting worse. Owing to hæmorrhages patient is almost a chronic invalid.

CASE III.

Woman, aged 35. Epistaxis began in girlhood and became alarming two and a half years ago. The telangiectases are here confined to the right side of the face, right nasal fossa, right half of the soft palate and uvula, and right faucial pillars; there are none elsewhere. The right cheek is often hot and covered with perspiration, while the other is cool. The surface temperature of both cheeks was taken over a period of several weeks, and that on the affected side was found to be the higher, usually by about 3° F. Pulsation can be felt in the cheek and is faintly visible in the tonsillar region; there is also a slight droop of the right half of the upper lip. No explanation of these symptoms could be obtained until Professor Osler kindly examined the case and referred them to the presence of an angeioma in the cheek.

In all three cases calcium chloride and iron have seemed to be of temporary benefit. The exhibitor has tried cauterisation of the telangiectases in the nose, but had to abandon it owing to the profuse hæmorrhages caused and the large number of points requiring to be touched. On the other hand, electrolysis can be recommended with the positive needle in the telangiectases; if carried out carefully there need be no bleeding and not much pain.

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[1] Case II. was fully reported in *Rev. hebd. de laryngol.*, 1906, xxvii., p. 181, and in the *Glas. Med. Journ.*, 1906, lxv., p. 411.

DISCUSSION.

Sir FELIX SEMON said the general silence with which the kind of case under discussion had been received was the best justification for his having induced Dr. Parkes Weber and Dr. Sidney Phillips to allow their cases to be shown at the Laryngological Section. They had been demonstrated at one of the recent meetings of the Clinical Section, and he thought they were of special rhinological interest. He had referred to several of the latest text-books on rhinology, but found no reference to cases of the kind. Yet it was remarkable, as would be seen from Professor Osler's paper in the *Quarterly Journal of Medicine*, in which he gave the history of such telangiectases in seven families, that the foremost symptom usually was epistaxis, and that was so also in the cases of Dr. Parkes Weber and Dr. Sidney Phillips. In text-books on rhinology one found only the remotest reference to that class of case, namely, the remark that epistaxis might be engendered by general hæmophilia. He had not found any statement coming from a rhinologist associating it with telangiectasis elsewhere, except in Dr. Brown Kelly's paper. He invited members of the Section to pay special attention, when people came with epistaxis, to the presence or absence of telangiectases in other parts of the body. The ordinary place on the septum for the occurrence of epistaxis seemed to be also that affected in the present cases. Thus it was, perhaps, not a very far-fetched idea that the class of ordinary cases of epistaxis without known cause might represent the smallest manifestation of a general tendency to telangiectasis. Now that attention had been drawn to the subject he thought the number of cases recorded in the future would be much increased, and wonder would be expressed that they had not been noticed previously.

Dr. LAMBERT LACK mentioned that Osler's cases were quoted amongst the causes of epistaxis in his (Dr. Lack's) book on diseases of the nose.

Specimen and Microscopic Sections of a Tumour of the Right Lobe of the Thyroid Gland.

By JAMES DONELAN, M.B.

THE patient was shown at the meeting on January 3, 1908. He was a male, aged 50, first seen on December 5, 1907; he had several lipomata about the neck, and, latterly, a swelling on the right side of the neck, which he thought was of a similar nature. Dysphagia had occurred somewhat suddenly five weeks previously and aphonia for three weeks. There was a history of syphilis and iritis. Mercurial inunctions and iodides were administered with diminution of the swelling, but the central hardness remained; the sight, voice and power of swallowing improved. He was discharged from the hospital but readmitted on January 7, with increasing dysphagia; no bougie was passed. He died suddenly on January 9 from asphyxia due to hæmorrhage into the trachea.

Autopsy allowed only within the limits of the neck. Specimen shows the larynx with portions of trachea and œsophagus. Dense fibrous growth in the site of the right thyroid lobe; extension between larynx and trachea and œsophagus, almost surrounding the latter; the œsophageal mucous membrane apparently unaffected. Below the right postero-inferior border of the cricoid is a cavity with necrosed tissue and blood and a passage leading into upper end of trachea. Vagus nerve extensively infiltrated. No enlarged lymphatic glands found in area examined. The sections show a squamous-celled carcinoma.

(The title of the original communication is preserved without prejudice to views as to the œsophageal origin of the disease.)

The PRESIDENT said some members had suggested that the condition was malignant. It seemed clear that the paralysis of the vocal cord was due to implication of the recurrent laryngeal nerve or the trunk of the vagus.

A Case of Intranasal Hypertrophy with Sweating of the Nose.

By JAMES DONELAN, M.B.

THE patient was a girl, aged 18, who presented intranasal hypertrophy, especially of the middle turbinals, associated with headaches and continual sweating, almost entirely limited to the nose.

DISCUSSION.

The PRESIDENT said there was considerable hypertrophy of the middle turbinals, and in association with that headaches were not uncommon; but apparently the sweating was not very evident that day.

Dr. DAVIS attributed the sweating to the fact that a branch of the nasal nerve was probably nipped between the enlarged middle turbinals and the septum. Since a lotion had been used the sweating had decreased. The nasal nerve supplied the skin of the nose and was in communication with the sympathetic.

A Case of Syphilitic Pachydermia.

By StClair Thomson, M.D.

The patient was a man, aged 35, who complained of a rough voice in the last nine months. He presented more or less symmetrical thickening over each processus vocalis, with central depression and ulceration and mechanical limitation in abduction of the cords. There was nothing in his nose and naso-pharynx to explain the condition. The examination of the chest and sputum was negative. There was no specific history. A small portion had been removed for microscopic examination but only showed fibrous thickening. The case had proved very resistant, as more than twenty inunctions of mercury had been given, and the patient had taken 15 gr. of iodide three times a day for nearly two months, yet the local symptoms were getting worse.

DISCUSSION.

Dr. Graham Forbes described the cases of two children, aged between 2 and 3; portions of tissue had been removed from the larynx of each, showing changes microscopically resembling those described in pachydermia laryngis. The first was a child, now aged 2¼, who had been continuously under observation since the age of four months. She was first seen by Dr. Poynton at the Hospital for Sick Children and presented unmistakable evidence of congenital syphilis, well-marked mucous tubercles about the anus and laryngeal stridor. Difficulty in breathing persisted, being worse at some times than others; in May, 1907, tonsils and adenoids were removed, a marked improvement resulting, but in November, 1907, the dyspnœa became much worse and she was admitted from Dr. Poynton's out-patients to the Hospital for Sick Children under the care of Mr. Steward. On November 28 an irregular mass was found on laryngoscopic examination at the posterior part of the glottis occupying the interarytænoid space. The mass was removed by forceps, and, on microscopical examination, showed hyperplasia and thickening of the surface epithelium into irregular papillary processes and downgrowths. The underlying tissue was densely invaded by small-celled infiltration, extending in places into the epithelial layers. The patient was subsequently discharged much improved, but had to be readmitted early in January of this year owing to return of dyspnœa. The larynx now showed thickening of the epiglottis, the vocal cords of normal colour, very close together and scarcely moving; the tissue of the rima glottidis showed a general infiltration. The condition appeared to resemble syphilitic hypertrophic laryngitis or pachydermia laryngis. The second case was a girl, aged 2¾, also under the care of Mr. Steward at the

Hospital for Sick Children; admitted with history of dyspnœa for past year, becoming worse after pneumonia ten months ago. On examination on December 12 the front of the glottis was found obstructed by a large papillomatous-like mass. This was removed, and, on microscopical examination, showed proliferation and hyperplasia of the surface epithelium; the deeper layers and papillæ were invaded by small-celled infiltration not so dense in character as in Case 1. There was no history or evidence pointing to congenital syphilis in this case, but the macroscopical and microscopical appearances of the material removed were very similar. Case 2 made a good recovery and was discharged three weeks later with normal breathing and perfectly well.

Mr. Clayton Fox said there was extreme limitation of movement in the cords; they did not move far from the cadaveric position. The appearance was consistent with pachydermia, and he thought it was due to syphilis.

Dr. StClair Thomson, in reply, said he hoped to have a confirmation that it was specific. Examination of the chest for tubercle was negative, but the case was resistant to antisyphilitic treatment. He had queried ulceration as he did not know whether the clefts over the processus vocalis were due to the pachydermia or to solutions of continuity.

A Case of Proptosis from Distension of the Frontal Sinus.

By StClair Thomson, M.D.

A woman, aged 20, with proptosis and displacement of the right eyeball, dependent on distension of the right frontal sinus. For three years this girl had noticed a swelling of the upper and inner angle of the right orbit, accompanied by aching pain. When the case was sent into the Section it was reported that no pus was discoverable in the nose, and that the case was apparently one of mucocele of the right frontal sinus, but at her second visit pus was found in the nose, and the right antrum and frontal sinus were both dark on transillumination. The patient then gave a clearer history, from which it appeared that she might pass days or even weeks without discharge, and that at such times her headache was worse.

Discussion was invited as to the nature of the case and as to whether the frontal sinus or the antrum should be operated on first if it were decided to open both these cavities. Authors were divided on this point. Dr. Thomson asked whether members, in such a case, would open the frontal sinus first or the maxillary sinus first. By opening the latter it enabled the frontal to be drained and to recover of itself, but the dressings of the maxillary sinus blocked up the frontal, and it was therefore thought by some that the frontal should be opened first.

DISCUSSION.

Mr. HERBERT TILLEY said he had seen only two cases of mucocele in fifteen years, and in each there was a history of painless distension and enlargement of the sinus. Though transillumination of the frontal sinus was not worth very much, if that were carried out in a mucocele it was found to be lighter on the distended side. The front wall of the sinus in this case was hard. On passing the finger well under the orbital ridge there was found to be nodular thickening. In view of what Dr. Thomson had said he thought it more probable that it was suppuration of the fronto-ethmoidal cells, or else their inner or nasal aperture was blocked, and hence the patient had pain, which was relieved by a discharge. It had been his custom to open the maxillary antrum and the frontal sinus at the same time, and for years he had refrained from putting dressings in the maxillary sinus, as he did not think it necessary. The operation was done to promote free drainage, and this would be interfered with by dressings, which kept the part wet and sloppy. Doing both operations at the same time only added seven to ten minutes to the operation.

Dr. LAMBERT LACK recommended that an incision be made into the orbit and the swelling opened. He thought it would turn out to be an ethmoidal mucocele which had possibly become septic. He had opened many similar swellings in the orbit; one turned out to be a frontal sinus, but all the others had been connected with the ethmoid. The present case he regarded as ethmoidal, probably posterior ethmoidal. It was necessary to open these mucoceles and drain them freely from the nose before they would recover.

Dr. W. HILL said that on first looking at this case he thought it was one of distension of the fronto-ethmoidal cells. Dr. Thomson would probably agree that there was some absorption of bone at the roof of the orbit, and it was a question whether this opening led to the frontal sinus or into an upper fronto-ethmoidal cell, to which Dr. Thomson had given the name of orbito-frontal. If there was absorption it was in favour of mucocele. The displacement of the eyeball was not so much downwards as outwards, a point against frontal distension. There was, however, a good deal of pulsation to be felt in the vessels near the roof of the orbit, and it might be that we had here to deal neither with mucocele nor with pus retention, but with a vascular condition.

Mr. STUART-LOW said that after considerable experience he had come to the definite conclusion that if there were polypi in the nose, especially of long standing, it was best to operate on the frontal sinus first. In every such case on which he had operated there had been polypi in the frontal sinus. If there were no polypi in the nose he would perform the maxillary antral operation first.

Mr. BARWELL said that in regard to treatment his opinion was very much that which Mr. Tilley had expressed, that generally it was preferable to operate on both sinuses at the same time, but if there was any strong reason against operating on both he would do the antrum first, because the frontal sinus operation was the more disfiguring, even with a very small incision, and might possibly become unnecessary after the antrum had been drained and the anterior portion of the middle turbinal removed. He never used packing or dressing in the antrum, and thus there was no likelihood of keeping discharges imprisoned.

Dr. FITZGERALD POWELL said he thought it was generally understood, looking at the operation from a conservative point of view, that the middle turbinate should be removed and the ethmoidal cells drained freely so as to clear the infundibulum and allow free drainage from the frontal sinus. Next, the maxillary antrum should be drained, and, if necessary, the frontal sinus operation should be performed last. Under this treatment some cases in which the pus appeared to come from the frontal sinus cleared up and got quite well without the necessity for the more serious frontal sinus operation.

Dr. STCLAIR THOMSON replied that there was a decided defect in the roof of the orbit, and the fronto-ethmoidal cell was communicating with it. He thought it a suppurating mucocele. There was always some shock and traumatism about such cases when operated upon, and he preferred not to do both at the same time. He knew of two cases in which radical cure was attempted in a maxillary sinus, and the antral condition set up fatal osteomyelitis, which apparently started from the frontal sinus. Dr. Tilley's plan was probably the best, but if he did only one it would be the frontal sinus.

A Radiograph of the Nasal Cavities.

By STCLAIR THOMSON, M.D.

THIS was exhibited to show how the orbito-ethmoidal, as well as the frontal cells, can be defined before operation.

At one of the meetings last year of the Laryngological Society of London (June 7, 1907, *Proceedings*, xiv., p. 104) Dr. Thomson demonstrated two dissected skulls to show extensive orbito-ethmoidal cells. Heretofore it was impossible to realise the presence of these cells before operation. Even at operation they might escape notice, as they were entirely unconnected with the frontal sinus, and only opened behind the Killian bridge into the infundibulum. The two radiographs showed how these extensive orbito-ethmoidal cells could be recognised beforehand, so that at the operation they might be searched for in the roof of the orbit. At a case operated on the day previous to the meeting a radiograph had been extremely useful, as a large cell, which was quite undiscoverable when working on the frontal sinus from above, was sought for and exposed beneath the Killian bridge.

Dr. WATSON WILLIAMS said members could congratulate Dr. Thomson on his excellent radiograph, as they would appreciate the difficulties involved in obtaining such a good picture. When an anatomical abnormality, which existed in this case, could be brought out, it must prove very helpful at the operation. Dr. Thomson mentioned that the lamp was put at the occiput, but in his own experience the great thing was not to get the lamp too far back over the occipital protuberance, because the light had then to go through the thickness of bone at the base of the skull; it should be placed so that the light rays passed through the skull a little above the occipital protuberance. If the patient went bald as a result of too long exposure, the hair was recovered again.

Microscopic Sections and Drawings illustrating the Pathogenesis of some forms of Nasal Polypi.

By P. WATSON WILLIAMS, M.D.

DR. WATSON WILLIAMS (Bristol) showed various microscopic sections and drawings of sections illustrating his view of the pathogenesis of some forms of nasal mucous polypus, more properly called œdematous fibroma. Some at least of these polypi associated with purulent discharge he considered were due to obstruction arising in the submucous lymphatic vessels, from the invasion of micro-organisms, which pass through the mucosal epithelium and invade the lymphatic spaces, whence they are carried to the lymphatic vessels, which become choked by the organisms. In some cases the organisms become destroyed or disintegrated or are carried along the vessels, the lumen of which then becomes re-established. When, however, this does not occur the process resulting from the involved lymphatic vessels is somewhat analogous to the occurrence of elephantiasis from lymph-vessel obstruction by the *Filaria nocturna*. In the former case one gets an ever-increasing accumulation of watery lymph in the area corresponding to the blocked lymphatic.

The areas crowded with cocci showed very little evidence of focal cell reaction around them, the whole process there evincing only a small amount of reaction when compared with any other type of subacute inflammation. In several of these presumably lymphatic vessels a single mononuclear lymph-cell could be seen through the organisms, but in no instance were any multinuclear cells visible, the inference being that these were lymphatic vessels and not phagocytic endothelial cells. In a few instances short strings of cocci appeared to have escaped beyond the vessel. In one section only Gram negative, and in another section Gram positive as well as Gram negative cocci were demonstrated.

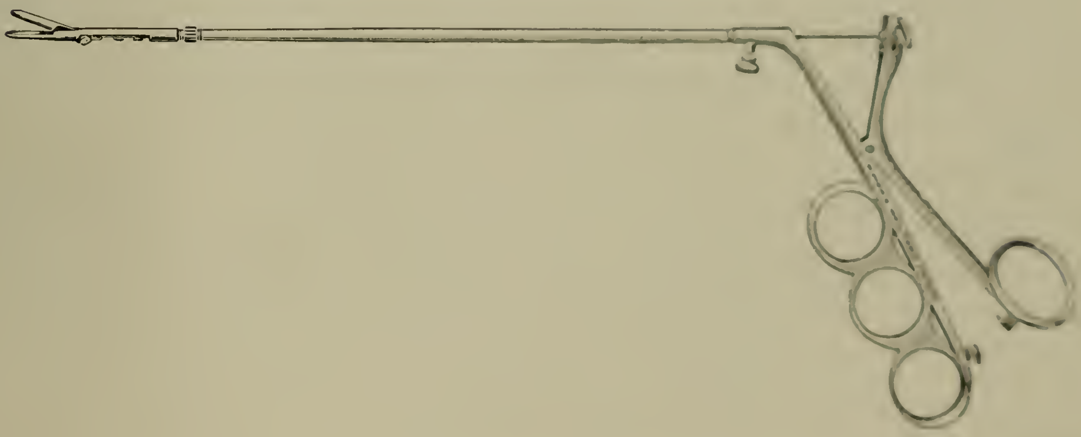
The sections were prepared by Professor Walker Hall, University College, Bristol.

A Universal Laryngeal Forceps for use by the direct and indirect methods.

By P. WATSON WILLIAMS, M.D.

DR. WATSON WILLIAMS demonstrated laryngeal forceps, which could be adapted for use by the indirect method or by the direct method (through Killian's tube) by simply changing the shank carrying the forceps' ends. The fact that the same handle could be used for antero-posterior, lateral, and up-and-down action forceps, cutting curettes, and laryngeal snares greatly facilitated their use in practice.

The instruments were made by Messrs. Mayer and Meltzer.



A Case of Unilateral Paralysis of the Tongue.

By W. JOBSON HORNE, M.D.

THE patient was a woman, aged 41, a music teacher. The paralysis had set in suddenly five months previously, but before this she had experienced severe pain, or rather tightness, in the left occipital region and pain over the left articulation of the jaw, with some inequality of movement of the same. Loss of taste had been noticed on the left side of the tongue. The patient associated the onset of the lingual condition with an injection into the gums for the extraction of stumps (one right lower and two left upper) prior to the making of a new dental plate, but the condition did not develop until three days after the extractions. The patient had been under electrical treatment for two months at a general hospital, discontinued on January 15; the condition had remained unchanged in spite of the treatment. The case was shown with the view of eliciting opinions on its nature and treatment.

DISCUSSION.

Dr. DAVIS said the case was a very interesting one, and though it was possible the patient had some pressure neuritis of the hypoglossal nerve, yet he regarded it as a functional case, and that any wasting of the tongue on one side was due to disuse.

Mr. STEWARD said the woman came to see him at Guy's Hospital four months ago, within a week or two of the onset of the condition. Owing to the history of the paralysis directly following the injection of cocaine by a dentist, he thought at first that it was probably functional. He sent her to the electrical department, where Dr. Hertz tested her carefully and found that there was definite reaction of degeneration, and that the condition was therefore due to an organic lesion. Since he saw her at the end of last year there had been a distinct change; there was more wasting and more contraction of the left side of the tongue. Dr. Hertz had not been able to say what the cause of the condition was, and had not found any other evidence of disease of the nervous system.

Dr. DAN MCKENZIE said it was difficult to make sure of the condition from a hurried examination, but, like Dr. Davis, he concluded that it was a functional disability because, as the tongue lay in the mouth, it was pushed to the sound side, because there was hemianæsthesia affecting the paralysed side, and because the history of it having come on just after cocaine was suggestive. There might be both hysteria and an organic condition.

Mr. CLAYTON FOX said that, after hearing that there was definite reaction of degeneration in the muscles in the left side of the tongue, one must assume that the lesion was in the nucleus or below it. For a long time the patient had had pain in the region of the great occipital nerve, and it was highly probable she had an aneurysm of the vertebral artery at the point where it wound around the medulla between the hypoglossal and suboccipital nerves; the neuralgia and paralysis would thus be accounted for.

Dr. DAVIS remarked, further, that the fact of her having reaction of degeneration did not at all mean that she had an organic lesion. If there was wasting of the muscle, whether from disuse or disease, reaction of degeneration often occurred in that muscle.

Dr. JOBSON HORNE, in reply, considered that there was more in the case than appeared on the surface, and for that reason he had brought the patient before the Section. He agreed with Mr. Clayton Fox to the extent that the lingual appearances could not be attributed solely to a functional cause. Dr. Horne said he would be pleased to bring the case again under their notice after the patient had undergone a course of treatment.

A Case of Sarcoma of the Nose, shown after Operation.

(With Microscopic Section.)

By W. CHICHELE NOURSE, F.R.C.S.

A MAN, aged 44, with left nasal obstruction of two months duration and epiphora of the left eye. Eleven months previously he had had a severe attack of epistaxis, followed, a week later, by pain under the left eye lasting for five weeks. The left eyeball was pushed slightly upwards with some proptosis. The left nostril was blocked by a fleshy growth which pushed the septum to the right. The left antrum was opaque on transillumination. Removal of a specimen with the snare was followed by free hæmorrhage. The pathological report of this was that it was a malignant growth. Preliminary ligature of the external carotid was performed on November 6, 1907, and laryngotomy five days later. The flap was formed as for removal of the upper jaw and a large opening made in the anterior wall of the antrum, which was filled with thick mucus. The nasal process was resected, together with part of the nasal and lachrymal bones and of the inferior turbinal body. The nasal cavity was thus freely exposed, and the tumour springing from the ethmoid removed with its bony attachment. The middle turbinal was found to be flattened out against the septum. The wound was closed and healed rapidly. Later, mucous polypi were removed, the frontal sinus full of thick mucus washed out, and an ethmoidal cell in the same condition broken down. Œdema of the lower eyelid persisted for two or three weeks.

PATHOLOGICAL REPORT.

By WYATT WINGRAVE, M.D.

The growth consists of closely packed fusiform cells, continuous with the periosteum of the ethmoid, from which it extends into the cancellous spaces. In all parts of the growth are seen tortuous and branched gland-like tubes lined with "palisade" epithelium, resembling tumours of the stomach and intestines.

A Case of Epithelioma of the Tongue and Fauces, shown after Operations.

(With Microscopic Specimen.)

By W. Chichele Nourse, F.R.C.S.

The patient, a man, aged 48, presented recurrences in the pharynx.

PATHOLOGICAL REPORT.

By Wyatt Wingrave, M.D.

Typical squamous epithelioma, showing solid epithelial columns and cell-nests.

A Case of Complete Closure of the Anterior Nares, with Partial and Progressive Atresia of the Naso-pharynx and Oro-pharynx.

By W. Stuart-Low, F.R.C.S.

The patient, an unmarried woman, aged 39, had suffered from, and been under medical and surgical treatment for, nose and throat disease for thirty-one years. She is a native of Cumberland, where she has resided all her life. Two cousins on her mother's side died of phthisis. Her father and mother lived to 75 and 81 respectively. There were thirteen children in the family. The first four were healthy, and are now strong and well, but after the father's return from Russia, where he had resided for seven years, there were three still-births, and six children were born, all of which died in infancy at ages ranging from six to eighteen months. The patient is the last of all the family.

On January 12 Calmette's tuberculin was instilled into the conjunctiva of the right eye and gave a fairly definite positive reaction. Six days later $\frac{1}{1000}$ c.c. of Koch's old tuberculin was injected subcutaneously. Six hours later the right eye (the one which had been treated by Calmette's method) was the seat of violent inflammation, pain and lachrymation, no other organs being affected. Six hours later the skin became very dry, temperature rose to 103° F., and she experienced considerable difficulty in breathing and swallowing. On inspection the mucous membrane of mouth, pharynx and larynx were much swollen, especially where scarred. The urine became loaded with amorphous urates, albumin was well marked, and there were crystals of oxalates. The constitutional disturbance continued for three days, when the temperature fell and respiration and deglutition became normal. Lachrymation ceased, but the ocular congestion subsided but slowly.

It is interesting to note that the chief local reaction occurred in the previously "Calmetted" eye. The nasal scar afforded no response whatever, while the oral, pharyngeal and laryngeal mucous membranes at the sites of infiltration responded slightly and also rapidly subsided. The right eye fourteen days later still showed some congestion.

The tuberbulin injection was employed as confirmatory evidence, on the supposition that Calmette's reaction might have been only mechanical

PATHOLOGICAL REPORT.

By WYATT WINGRAVE, M.D.

The tissue removed from tongue and lip shows a papillomatous arrangement of the epithelium, but no definite evidence of granuloma.

DISCUSSION.

Mr. **BABER** considered it to be a case of congenital syphilis.

Sir **FELIX SEMON** thought there was no doubt that it was syphilitic.

Dr. **STCLAIR THOMSON** pointed out that the patient heard very well with complete nasal obstruction, and, in spite of all the views on nasal breathing, she never caught cold or laryngitis, nor had colds on the chest.

Mr. **STUART-LOW**, in reply, said Dr. Wyatt Wingrave obtained only a feeble Calmette's reaction, but six days afterwards subcutaneous injection of tuberculin caused a great reaction in the same eye. Why that should have occurred it was difficult to say. The question was whether the condition was one of lupus or inherited syphilis. He thought it was a blending of the two. The father probably contracted syphilis in Russia.

Cases after the Radical Maxillary Antrum Operation exemplifying simplification of the after treatment.

By W. Stuart-Low, F.R.C.S.

The operation is so performed that all syringing can be dispensed with, the patient being easily able with the tongue and lips to force fluids from the mouth through the antrum into and out of the nose. In this way these cavities can be frequently irrigated, and so maintained aseptic. The rapid regeneration of the mucous lining of the antrum is greatly facilitated by plugging the cavity with oiled silk for the first forty-eight hours after operation.

DISCUSSION.

The President said he did not know what the simplification in the after treatment in the case consisted of. This system of washing through the mouth was very old, and many patients had found it out for themselves. He thought it was not a method to be commended; he had never encouraged it, and could not see any advantage in it. Nor did he understand the advantage of the oiled silk, as he understood that the mucous membrane lining the antrum had been completely removed. In such a case regeneration must be a very slow matter, and must take place by gradual creeping in of epithelium from the nose. He did not see what difference the application for a few hours of oiled silk could make.

Mr. Herbert Tilley said that when he found a bucco-antral fistula following an operation he looked upon it as a complication rather than a simplification. He supposed most surgeons had tried to close such a hole some months after operation, in which no stitches had been put in to anchor the wound in the line of incision over the canine fossa. Patients with such a fistula found particles of food passed into the antrum and came out from the nose, so that he never now did a radical maxillary operation without putting in horse-hair stitches to encourage healing by immediate union. If left open there was a possibility of a permanent fistula. He did not think the position in which the opening was left had much to do with the production of a fistula. Mr. Low spoke of the procedure he adopted as aseptic, but he, Mr. Tilley, did not see how such an opening into the buccal cavity could be so called: it was surely better to suture the wound and thus keep anything from entering the antrum. He agreed with the President that if mucous membrane was removed its place must be taken by granulation tissue, and unless this was covered by epithelium or epithelium crept in from the naso-antral margin, there must be a certain amount of suppuration. To put in oiled silk for forty-eight hours would only keep in contact with the wounded surface a number of septic organisms, and he did not see how the procedure could promote the growth of epithelium.

Dr. JOBSON HORNE said it was a matter of common knowledge that at times after the operation for the cure of empyema in the antrum of Highmore the patient could force fluid, and for that matter solids, down the buccal cavity, through the antrum and out of the nose, a condition of things which, as a previous speaker had remarked, they were liable to be called upon to remedy. Dr. Horne, therefore, could not view favourably the procedure that had been followed in the case before them. Dr. Horne, in his own practice, had obtained results in every way satisfactory by adopting measures less extreme. He found that the less packing of the antrum that was done after the operation the quicker and better was the recovery.

Dr. FITZGERALD POWELL said that if, a short time ago, anybody had suggested that an opening into the anterior wall was not to be made, he would have been told he did not know his business in its later developments. It was held that that wall should be taken away and the antrum thoroughly explored and all polypi removed. He had never approved of that method, and he had as good, or better, results by making drainage through the nose or through the tooth socket; and he thought it was the wrong position in the present case to open the antrum in. As good drainage could be obtained from the nose or through the most dependent part, viz., the tooth socket. It was impossible to entirely scrape away the mucous membrane. There was no such thing as regeneration of mucous membrane; there was regeneration of lining membrane by scar tissue.

Dr. MCBRIDE asked how long the patient had suffered from the empyema and how long ago the operation was done. He understood the patient to say it was only three weeks. He condemned the washing out from the mouth: it seemed contrary to all their ideas, as it was washing from a septic cavity into one it was desired to keep as far as possible aseptic.

Mr. CLAYTON FOX said he did not see very much against the cleansing of the antrum by the method adopted by Mr. Low, but what he did take exception to was the statement that the mucous membrane was rapidly regenerated under his principle of introducing oiled silk into the cavity for a short time after operation. All the muco-periosteum in this case had been removed, and, at the best, the ultimate lining of the antrum would be fibrous tissue covered with epithelium, and this would be an extremely slow process under any treatment.

Mr. STUART-LOW, in reply, said that his success with the open method of operation was great, and he had never had any trouble in the after treatment, which was so simple and easy. For instance, he operated upon a patient last August, just before his holiday, and did not see him for a month, and when the patient came again he said the incision had closed at the end of a week. He had now performed a large number of these operations, and had never had the slightest approach to anything in the nature of delayed closing or fistula. He was in favour of not stitching, and his experience strongly supported this open method; but how many tinkering, ineffective, and scraping operations where the mucous lining was left were done? The smell in the present successful case, at the time of operation, was so offensive that his assistant had to stand back, and was it possible to leave such a diseased mucous lining and yet effect a cure? The mouth could, in his opinion, be easily made aseptic as in and after cleft palate operations, and this patient had not a carious tooth left in his head. He suggested that Dr. Horne should try this method, in which he could watch the regeneration of the mucous membrane. This took place before one's eyes, and he had seen it complete in a week. With regard to the use of oiled silk, he contributed an article to the *Lancet*, "The Use of Animal Blood-Serum in Surgery,"[1] in which was explained the great utility of applying oiled silk to an aseptic healing surface. The serum, according to Sir A. Wright's researches, proved to be a perfect aseptic irrigating agent.

A Case of Swelling of the Arytænoid.

By ANDREW WYLIE, M.D.

THE patient, a woman, aged 43, complained of hoarseness of thirteen months duration, with pain on swallowing and pain in the left ear. The patient was in the best of health; there was no loss of weight, no stricture of the œsophagus, and no specific history, but there was slight glandular swelling in the neck. The left arytænoid was greatly swollen and œdematous, hiding nearly the whole of the left vocal cord from view. There had been no improvement with antisyphilitic remedies.

A Case of Epithelioma of the Left Vocal Cord.

By HERBERT TILLEY, F.R.C.S.

PATIENT, aged 56, is a man of fine physique. He complains only of hoarseness of some four months duration. On the left vocal cord, occupying the middle third of its length, is a pale, irregular, warty granulation surrounded by a slightly congested area. The movement of the cord is not so free as its healthy fellow. Iodide of potassium had been administered on two occasions, but the symptoms of iodism were so marked and distressing that its use had to be discontinued.

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[1] *Lancet*, 1907, i., p. 1221.

A Girl, aged 17, with a genuine Baritone Voice.

By Cyril Horsford, F.R.C.S.

The patient had been appearing during the last nine months at various music-halls as a genuine baritone. About two years ago she suddenly discovered that she possessed such a voice. The larynx was somewhat larger than normal, and the vocal cords presented nodes and were markedly red and swollen.

The exhibitor propounded the following questions: Is the voice the result of an unusual method of voice production? Is it the result of the laryngitis? or can the character of the larynx be described as that of a *male larynx?*

DISCUSSION.

Dr. **Donelan** asked whether Mr. Horsford had satisfied himself as to the sex of the patient. There had been cases likely to puzzle a very acute observer. Was it a case of pseudo-hermaphroditism? In such cases there was often a similar voice.

Dr. **Jobson Horne** said that Mr. Cyril Horsford had submitted three questions for their consideration: Was the voice the result of an unusual method of voice production? Was it the result of laryngitis? or could the larynx be described as a "male larynx"? Dr. Horne wished to answer all three questions in the negative and to add his opinion that the larynx was one *sui generis*. Dr. Jobson Horne indicated how the vocal cords appeared to him, from a fugitive glance, to differ from the normal in their physiological structure and functions.

Dr. **Aikin** said the vocal cord was longer than in the ordinary female larynx, and one was larger than the other. There suddenly came a deep note when she was aged 14, and it had remained a permanent condition. The sound was that of a large reed in a small resonance chamber. He believed it was a male type of larynx in a small cavity, though the cavity was larger than usually met with in a girl of that size.

Sir **Felix Semon** thought that any explanation of the cause must be a more or less wild hypothesis, such as that just advanced by his friend Dr. Horne. He was curious to know what a "larynx *sui generis*" was. Dr. Horne denied the existence of laryngitis, but there certainly were nodules present. The vocal cords were not longer or broader than often enough seen in the larynx of an ordinary female, especially in professional contralti. But he thought the pomum Adami in this case was more prominent than was usual in females, though he would not put that as an explanation of the peculiar voice.

The first question he had asked Mr. Horsford before the discussion was as to whether there was any hermaphroditism in the case. When the patient sang, he shut his eyes so as to be unbiassed in his judgment, and he could not say the impression was quite the same as that produced by the voice of a real baritone or a real contralto. He suggested an examination by a gynæcologist.

Mr. HORSFORD, in reply, said her voice broke at the age of 14, as was the case with boys. She previously had a big soprano voice, which was described as having a boy's quality. During the eighteen months following the break she could sing in two voices, and then discovered that her best voice was a deep one, and ultimately her top register disappeared. It was now exactly an octave lower than contralto. He had not got definite information as to the patient's sex, but the mammæ were normally developed for a girl of that age. Her family doctor could not enlighten him. Menstruation was normal, but somewhat irregular. She certainly had marked laryngitis, and six weeks ago so severely that on abduction the anterior halves of the cords could not be separated at all. She did not suffer from dyspnœa, and she had recently been having mild treatment. The voice was now more clean, but nothing seemed to alter its pitch. The voice might be the result of the persistent laryngitis, but he did not think cure of the laryngitis would now cure the voice, and as regards the size of the larynx he certainly considered it was larger than that of a contralto of her age.

A Case in which an Endothelioma had been removed from the Hard Palate.

(With Specimen.)

By DAN McKENZIE, M.D.

THE patient, a young woman, had been aware of a lump in the roof of her mouth for many years; recently it had increased in size. The tumour was of the size and shape of an almond; it lay in a periosteal capsule, and it had hollowed out the bone to a slight extent.

PATHOLOGICAL REPORT.

By WYATT WINGRAVE, M.D.

The specimen is composed of endothelial elements growing in cylinders, hollow and solid. In parts the arrangement is in regular parallel columns, in others it is branched. The stroma is composed of smaller cells of a different type. It is an endothelial sarcoma.

A Case of Median Cervical Fistula, shown after Operation.

(With Microscopic Specimen.)

By J. DUNDAS GRANT, M.D., and DAN MCKENZIE, M.D.

THIS patient was shown at the meeting on December 6, 1907, and the fistula had subsequently been closed by operation by Dr Dundas Grant.

PATHOLOGICAL REPORT.

By WYATT WINGRAVE, M.D.

The specimen shows an irregularly shaped tract devoid of epithelium, surrounded by dense cicatricial tissue. Near it is a duct lined with "palisade" epithelium, which is evidently a relic of the thyroglossal duct. The exhibitor has examined four such cases. In each there were several similar tubes. In one case cilia were present; in the others the columnar epithelium was plain. Multiple tubes may be due either to lateral offshoots or to extreme convolutions of a single duct.

Dr. DAN MCKENZIE, in reply to a question, said Dr. Grant had performed the operation. An elliptical incision was made so as to embrace the fistulous opening, and the duct was dissected back to the base of the hyoid, at which point it seemed to be very closely incorporated with the periosteum of the hyoid bone. Here the duct was severed, and its continuation under the hyoid bone was not found, but Dr. Grant tried to obliterate the sinus by passing the electro-cautery along its lumen. Whether he had succeeded in doing so the future would tell.

A Case of Ulceration of the Nose.

By W. H. KELSON, M.D.

THE patient, a woman, aged 52, presented a small ulcer situated on the left side of the external surface of the nose. It was noticed during a routine examination of the parts and was covered by a small hemispherical scab about half the size of a pea. It gave rise to no pain or inconvenience and had been observed for two years by the patient, who thought that it had very slowly increased in size.

A Case of very Extensive Epithelioma of the Fauces.

By J. Dundas Grant, M.D.

The patient was an elderly man, who presented a very extensive epithelioma of the right side of the fauces. The symptoms were of very short duration in comparison with the extent of the disease, which must have existed for a considerable time without causing the patient any great discomfort. The question arose as to the advisability of operation.

A Case of Tuberculosis of the Larynx.

By William Hill, M.D.

The patient, a male, aged 25, had suffered from pulmonary phthisis with repeated hæmorrhages for twelve years. There was perichondritis of the epiglottis, which was immovably fixed in a horizontal position.

Laryngological Section.

March 6, 1908.

Dr. J. BARRY BALL, President of the Section, in the Chair.

A Case of Necrosis of the Arytænoid Cartilage.

By HAROLD BARWELL, F.R.C.S.

THE patient, a police sergeant, when first seen in November, 1906, complained of hoarseness and dyspnœa on exertion. No sign of phthisis could be detected, and no history pointing to syphilis could be obtained. The right arytænoid was swollen and fixed, the right band was so swollen as to hide the cord, and from the right side of the interarytænoid region a white mass projected into the glottis, and suggested by its appearance a necrosed piece of arytænoid cartilage. Mercury and potassium iodide were given by the mouth for a few weeks, but were then discontinued, as they did not suit the patient and had had no effect on the local condition. This has remained practically unchanged up to the present time; the voice has improved, but the dyspnœa is often troublesome, though it does not seem ever to be of dangerous severity. The case was put down for exhibition at the last meeting, but the dyspnœa became worse and he was too ill to attend.

DISCUSSION.

Mr. CLAYTON FOX said that in the absence of a history of any acute inflammation the case might be one of syphilis, probably gummatous infiltration of the covering of the arytænoid, which was now necrosed. It was a moot point whether it should be removed by forceps or whether laryngo-fissure should be done. In the latter case, one would obviate the patient dying of suffocation at a later date from extrusion of the cartilage into the glottis.

Mr. DE SANTI thought the dyspnœa was sufficient to endanger the patient's life, and that either tracheotomy or laryngo-fissure should be done. At any time he might have acute suffocation and die.

Mr. BARWELL, in reply, said he had watched the patient for sixteen months and he had got no worse, but rather better; but he was worse again now, and he proposed to do a tracheotomy, and afterwards he would try to remove the necrosed cartilage by the mouth. He would not like to put forceps into his larynx without doing a tracheotomy first, as he would probably get an access of suffocation. He would remove the necrosed arytænoid by means of punch forceps.

A Case of Partial Occlusion of both Anterior Nares by a Congenital Cutaneous Web.

By GEORGE K. GRIMMER, M.D.

THE patient, a man, aged 32, has had difficulty in breathing through the nose as long as he can remember, and for some years the nose has been completely blocked on waking in the morning. He has never been able to run or take other active exercise without breathing through the mouth. There is no history of a purulent discharge from the nose at any time since birth.

Examination showed the anterior nares to be occluded in rather more than the lower half by a cutaneous membrane situated at the inner extremity of the vestibule. The membrane was thin at its upper extremity, gradually thickening to about ¼ in. at its base.

Operation on the right side: An incision was made at the junction of the web with the septum, straight down to the floor of the nose, keeping close to the septum; on the outer side a similar incision was made, but sloping somewhat outwards; the flap thus formed was not cut off but bent backwards towards the posterior nares and fastened to the floor of the nose by a single horsehair stitch.

On the left side: The web was completely burned away with the galvano-cautery. On removing the webs the turbinals were found enlarged, especially the right middle, the anterior end of which was removed; a small portion of the mucous membrane along the lower edge of the right inferior turbinal was cut off with scissors and the left inferior turbinal was cauterised.

DISCUSSION.

The PRESIDENT (Dr. Barry Ball) considered the result of the operation to be very satisfactory. Not having seen the case beforehand, it was not easy to judge of the difficulty of it, but he believed such cases were fairly difficult.

Sir FELIX SEMON pointed out that the man had never been deaf, although throughout his life he had suffered from complete nasal obstruction.

Dr. P. McBRIDE congratulated Dr. Grimmer on the result, particularly as more elaborate operations had been recommended for the condition, one of which consisted in cutting out the membrane, stitching, separating the ala and transplanting it outwards, at the same time turning up a flap from the lip; but the present case showed such a good result that it was a plea for employing simpler means first.

Dr. SCANES SPICER did not think it was alleged that complete intranasal obstruction caused deafness; it was that degree of incomplete stenosis which, if nasal breathing were practised, compelled an excessive forcing of inspiration through the nose; hence, abnormal negative pressure and suction of mucosa, which led to chronic congestion, catarrhal ear disease, and deafness. Directly the obstruction was sufficient to compel mouth-breathing it ceased as such to influence the condition of the pharyngeal, Eustachian and, hence, indirectly, the aural mucosæ.

Dr. GRIMMER, in reply, said he had intended to present the case before operation on the left nostril, and expressed regret that owing to a misunderstanding about showing the patient, the point of chief interest (the web) had been removed. He thanked those who had expressed approval of his method of dealing with it.

A Case of Extensive Adhesions in Pharynx and Larynx of Syphilitic Origin.

By H. BETHAM ROBINSON, M.S.

THE patient, a man, aged 36, says that at the age of 20 he had diphtheria, and after that all these changes occurred. After coming out of the fever hospital a hole came in the roof of his mouth and the back of his throat was sore. A year or two later he lost his voice and this has been husky ever since.

He came up recently to the hospital because his breathing had latterly become difficult. His general condition is poor, and he has an infective keratitis of the right eye. There is a large perforation of the hard palate into the nose; most of the soft palate has been destroyed and its remains adhere to the posterior pharyngeal wall, leaving only a small vertical central opening into the naso-pharynx. On inspecting the larynx it is seen that the outline of the epiglottis has disappeared by its incorporation in cicatricial tissue at the root of the tongue. No ventricular bands or vocal cords can be differentiated; on each side there is only one band of a light pink colour which seems to be formed by the fusion of ventricular bands and vocal cords. On phonation these come together fairly well at their anterior part, but the sound produced is very gruff. There are cicatricial changes in the right pyriform sinus. In the subglottic region or upper part of the trachea there is a reddish nodular outgrowth (? granulation tissue), and there is prominence of the third tracheal ring. There is considerable inspiratory stridor.

Mr. ROBINSON said he had been wondering to what extent the stenosis was going on in this patient's trachea. He seemed to have considerable difficulty in breathing, and he (Mr. Robinson) proposed to take him into hospital and put him thoroughly under treatment and note its effect.

Endothelioma involving the Lower Part of the Larynx and Pharynx.

By H. BETHAM ROBINSON, M.S.

THE patient in whom the above condition was present was a single woman, aged 61, and was seen at St. Thomas's Hospital in July, 1907, on account of her loss of voice and difficulty in swallowing. There had been dyspnœa on exertion for two years, which had been getting worse for the past three months. Since Christmas, 1906, her voice had been failing, and for three months she had been aphonic. For several months there had been dysphagia for solid food, but there had been no regurgitation of food. Twice she had brought up blood on coughing. There was slight pain behind the sternum and at the root of the neck. She had lost flesh.

Laryngoscopic examination showed a larynx with a cavity deep vertically, and with both vocal cords immobile in almost the mid-line, otherwise the general appearance was quite normal. Below the level of the cords, at a distance estimated as the lower border of the cricoid, was a nodular reddish growth springing from the posterior wall.

A medium-sized œsophageal bougie could be passed with difficulty, and it produced considerable discomfort. There were no enlarged glands in the neck and no evidence of any other growths.

She was admitted into the hospital and, on July 10, tracheotomy was performed on account of her dyspnœa. The high operation was selected in order to inspect the lower part of the laryngeal cavity, and the growth previously seen from above was found. It was springing from the lower half of the posterior part of the cricoid and formed a nodular polypoid projection into the larynx. Part only could be removed as it was found to extend deeply into the cartilage and the fibrous tissue between it and the trachea. At a later date the posterior cricoid region of the pharynx was examined by Killian's method and a growth was seen.

The patient died on August 7, and at the autopsy the next day the local changes previously described were confirmed. Extending downwards into the trachea, almost to its bifurcation, were several small white nodules suggesting secondary deposits; the mucous lining of the trachea was of a smoky red colour. Behind the upper part of the œsophagus was an abscess, but no communication with the tube could be determined. In the apex of the left lung was a small abscess cavity. No secondary growths were found. The histological appearance of the tumour is that of an endothelioma. At present our knowledge of these growths is limited, but I do not think one has ever been reported occurring in this situation.

From the clinical side it is worth noting the duration of symptoms and the non-involvement of lymphatic glands, both points consistent with the character of the growth. It might be urged that an epitheliomatous growth in this part of the laryngeal cavity might not cause gland enlargement; such might be true at the early stage of its appearance, but not when it has existed for some time, and especially when it had involved the œsophagus.

Sir FELIX SEMON said Mr. Robinson stated that there was seen with the laryngoscope an extensive subglottic growth, with abductor paralysis of both vocal cords. In that case obviously it had been possible to look, in spite of the stenosis, through the glottis, and to see that there was some new growth underneath; but occasionally cases occurred in which there was complete bilateral abductor paralysis, in which it was not possible to see the subglottic cavity and in which no explanation was forthcoming of the cause of the paralysis. In such cases one should always remember the possibility of the existence of a subglottic growth. Twenty years ago he had published a case of the kind in the *Transactions of the Pathological Society*, in which the vocal cords were seen in the position of complete double abductor paralysis, and the explanation was only found after death to have been a subglottic alveolar sarcoma fixing the vocal cords in the adducted position, so that the appearance of double abductor paralysis was simulated.

Specimen of a Tonsil apparently composed of a Mass of Papillomata.

By A. R. TWEEDIE, F.R.C.S.

THIS specimen formed one of a pair of tonsils removed by Dr. Marschik at Professor Chiari's clinique. The entire substance of both tonsils consisted of a mass of papillomatous excrescences.

Dr. STCLAIR THOMSON said he had shown at the Laryngological Society a tonsil which had two large growths hanging out of one of the follicles, and at the same meeting Dr. McBride showed a case. They looked exactly like papillomata to the naked eye, but under the microscope they were found to consist of ordinary tonsillar tissue.

A Case of Multiple Telangiectases.

By E. B. WAGGETT, M.B.

THE patient is a man, aged 55, married, but without children, a professional player of wind instruments. He is of robust build but markedly anæmic, and gives a history of hæmorrhage from the nose at very frequent intervals since about the age of 20. He has also had hæmorrhage from the face and lips externally. The bleeding is neither better nor worse now than it has been throughout his life. The application of the galvano-cautery to the nose checked the epistaxis for a few weeks.

He has a sister (not seen) who is stated to have the same symptoms. There is no other family history of importance. Dilated vessels are seen upon Kiesselbach's area on both sides, and it is from these that the epistaxis occurs. Telangiectases are visible on the middle turbinals, the tongue, the edges of the lips and upon the skin of the cheeks externally. Those upon the tongue, about ten in number, take the form of definite circular spots about the size of a millet seed, while on the lips they assume the shape of small hemispherical tumours. The coagulation time of the blood is prolonged, but the exhibition of calcium internally has had no effect upon the epistaxis.

DISCUSSION.

Mr. DE SANTI said he had been asked to examine in the hospital a similar case, in which the woman had bleeding from the nose, but he had not found any growth or venules pointing to the occurrence of nævoid tissue. She also had extensive hæmorrhages from the bowel, but examination with the sigmoidoscope showed a normal lower bowel.

Dr. WATSON WILLIAMS said that, in connection with the fenestrated faucial pillars in this case, it was interesting to note that the man had never had scarlatina and did not remember having had acute inflammatory disease in the throat to account for the perforation. In a large number of the recorded cases of the kind there was a history of scarlatina, and it had been suggested that they were not congenital, but the result of ulceration; thus there was no history of any *intravitam* cause for the fenestrations.

A Case of Mucocele of the Frontal Sinus.

By F. J. STEWARD, M.S.

THE patient, a woman, aged 62, has had proptosis of the left eye and a swelling at the upper and inner angle of the left orbit for eleven years. The size of the swelling varies considerably, decrease in size being associated with muco-purulent discharge from the left nostril.

In July, 1899, the swelling was incised and a quantity of muco-pus evacuated; after this operation the swelling did not reappear for three years. The left eye is now markedly proptosed and displaced downwards and outwards, movements being limited, especially in an upward direction. There is a swelling of considerable size in the position of the left frontal sinus, the orbital surface of which is firm and elastic, but not bony. The radiogram shows distension of the frontal sinus.

DISCUSSION.

Mr. HERBERT TILLEY said the skiagram led him to think that some of the protrusion of the eyeball was due to distension of the fronto-ethmoidal cells. He had only seen two cases of mucocele of the frontal sinus, and in both the anterior wall was distended, and presented egg-shell crackling. In the present case the anterior wall was hard and did not seem to be distended. He asked what treatment Mr. Steward proposed to carry out.

Dr. DUNDAS GRANT remarked that Mr. Steward did not say whether, when he did the last operation, he made a communication with the nose.

Dr. FITZGERALD POWELL said that the drainage, he thought, was not very free. The middle turbinate did not appear to have been dealt with; possibly the return of the symptoms was due to the blocking of the ostium. In his opinion the middle turbinate should be freely removed and an effort made to restore the drainage in the nose before doing any external operation.

Dr. SCANES SPICER said he thought there was some distinct bulging above the point of junction of the ascending limb of the middle turbinate with the outer wall of the nose, and that supported Mr. Tilley's view that it was an orbito-ethmoidal mucocele. He would try to open that in the nose at a point above where the ascending limb joined the outer wall; he thought the middle turbinate itself looked healthy.

Mr. STUART-LOW said he thought that the case was one of mucocele of the frontal sinus. He had assisted in operating on a similar case, the patient being a man past middle age who had been playing golf the day before. He was dead in a fortnight from septic meningitis. In the present case he would first remove the middle turbinate, which was very large, and thus give free drainage. The condition might then subside. Mr. Steward said that when an incision was originally made the swelling diminished, so that if drainage were made free into the nose by removing the turbinals the disease might disappear. He counselled this modified operation rather than the complete and radical removal of the mucocele, as the probability was with such a long history that the posterior wall of the sinus was eroded and the dura mater exposed.

Dr. MILLIGAN thought it was a combination of exostosis and mucocele.

Mr. WAGGETT said he had a case of mucocele which did very well with operative treatment through the nose. In skiagraphing such a case one could get much better results by bending the patient's head right back so that the rays did not have to traverse the occiput before reaching the frontal region.

The PRESIDENT pointed out that the case was treated in an eye department. In the only case of mucocele of the ethmoid which he treated he opened from the outside and simply made a free communication with the nose, and he had no trouble with it afterwards.

Mr. STEWARD, in reply, said the woman attended the ophthalmic department at Guy's, and was admitted under Mr. Higgens ten years ago. An incision was made for diagnostic purposes and a cavity was found lined with mucous membrane, and containing pus and mucus. Mr. Higgens thought the cavity was probably the frontal sinus, and put a tube in for a short time and then allowed it to heal up. She was much gratified by the result, as she was quite cured for three years. Mr. Steward founded his opinion that it was probably frontal sinus partly on what Mr. Higgens found and partly on the skiagram. He did not, however, see how one could be absolutely certain whether it was frontal or ethmoidal. An ethmoidal cell, even a small one, might be enlarged and push the wall of the frontal sinus out of the way. But the skiagram showed a great difference in the size of what appeared to be the frontal sinus on the two sides. Rhinoscopically, he thought the middle turbinate was quite normal. He examined the middle meatus with a probe, but could not feel any soft patch, and he could not get a cannula to pass any distance into the infundibulum. He determined to open it from the orbit and probably make a large opening into the nose. If necessary, he would remove the mucous membrane and allow the roof of the swelling to form the roof of the orbit.

A Case of Venous Angeioma of the Soft Palate.

By HUNTER TOD, F.R.C.S.

THE patient, a man aged 48, sought advice because he found he was beginning to stammer and could not speak distinctly. There is a large, smooth, globular swelling about the size of an egg in the region of the soft and posterior portion of the hard palate on the left side. It is of a bluish-purplish colour. On pressure with the finger it is markedly compressible, and there seems to be some absorption of the posterior part of the hard palate. Medially it involves the uvula, laterally the anterior pillar of the fauces and base of the tongue. It was, apparently, first noticed two years ago, but no treatment has hitherto been attempted. The treatment now suggested is electrolysis.

DISCUSSION.

Dr. McBRIDE said that many years ago he showed a painting of an angeioma occupying much the same position. He asked whether there might not be some other form of tumour present as well.

Dr. MILLIGAN said that some years ago he had had an almost identical case, and the treatment adopted was electrolysis. After fifteen or twenty sittings the angeioma almost entirely disappeared.

Dr. FITZGERALD POWELL said he had shown a similar case, and the general opinion seemed to be that they were best left alone, but the present case called for special treatment. It was in a dangerous position, liable to get wounded, and to be nipped between the teeth when it got a little larger, when the patient might bleed to death. He thought probably the external carotid would have to be tied; electrolysis could be applied to whatever remained of the angeioma.

Mr. WAGGETT asked whether such tumours had been injected with hot water, in the vessels, in the manner which had been employed with malignant tumours.

Mr. STEWARD supported Dr. Powell's remarks. If electrolysis were done and the punctures happened to become septic the result might be very serious. He had seen severe hæmorrhage occur from a nævus very like the present case. He tied the external carotid, with a satisfactory result. In regard to the injection of paraffin, he had heard of a case in which that was tried, and the patient died immediately. Post mortem, a piece of paraffin was found in the circle of Willis.

Mr. TOD, in reply, said he could not give the origin of the growth nor say whether it was increasing in size, as he had only seen the man once—a fortnight ago. The patient had no symptoms except that he could not always breathe freely nor speak clearly. Mr. Tod thought the growth was so compressible that the question of malignancy could be excluded. He agreed with the suggestion to tie the external carotid and then do electrolysis. The latter treatment would be undertaken by Dr. Morton, of the London Hospital. Mr. Tod said he would be afraid to try injections of paraffin because of the possibility of an embolus resulting. He would be pleased to show the patient again to the Section after treatment had taken place.

Note.—Since the meeting the patient has been operated on. The ascending pharyngeal, the lingual and facial branches, and the main trunk of the external carotid were tied. During the operation laryngotomy had to be performed owing to obstruction of breathing. There has been an uneventful recovery from the operation, with complete healing of the wounds. There is, however, no apparent diminution in the size of the growth. Dr. Morton, on further consideration, did not recommend electrolysis, owing to danger of hæmorrhage, unless he could be assured that if this took place it could be at once arrested by the surgeon. In consequence the treatment by electrolysis has not been carried out.

Case of Leprosy with Lesions in the Nose, Pharynx and Larynx.

By StClair Thomson, M.D.

This patient, a coloured seaman from the West Indies, shown by the favour of Sir Malcolm Morris, under whose care he has been in the Seamen's Hospital since May 17, 1907. He then presented the typical leonine appearance, and the marked improvement in his condition was made apparent by comparison with the photograph taken some time ago. The extent of the leprous infiltrations on the face, neck, forearms, wrists and groins, legs and ankles was indicated on an outline chart handed round. On admission a film taken from the nasal mucus revealed typical leprosy bacilli. During the period under observation his temperature has risen occasionally at irregular intervals, frequently reaching 104° F. This rise of temperature was generally associated with the fresh outbreaks in the skin, and during these attacks swabs from the pharynx showed the bacilli in abundance. During the apyrexial periods the bacilli were discoverable with difficulty. This observation is possibly a valuable contribution to settling the question of how the contagion is conveyed. Inquiry as to the earliest symptoms showed that spontaneous attacks of free epistaxis were first observed some five years ago, about the same time that he noticed the nodules on his wrists. As the skin lesions developed, the attacks of epistaxis ceased. At the present moment he is not subject to epistaxis. There are no typical lesions in the nose, which shows atrophic rhinitis. The uvula is atrophied to a small knob. The soft palate and fauces are infiltrated with a brawny material, so as to have lost their elasticity. In the mid-line of the centre of the soft palate is a pale scar, with white radiating lines and a slightly blackish margin. This appearance has been described as characteristic of leprosy. It is apparently due to the resorption of an infiltration. As a consequence of the loss of elasticity of the palate the patient is unable to bring it in contact with the posterior pharyngeal wall, and so his speech shows some rhinolalia aperta. The epiglottis is large, pale, and infiltrated, and overhangs the larynx so that the glottis has not as yet been visible. When first admitted there was no anæsthesia, but this has lately been detected on the hands. The patient speaks fairly well, with a woolly intonation. He has been treated with an ointment of salicylic acid and Chaulmoogra oil, and the photograph handed round serves to emphasise the remarkable improvement in the lesions on the face. A slide showing the leprosy bacilli is placed under the miscroscope.

Case of Nasal Obstruction.

By H. J. Davis, M.B.

The patient, a woman aged 27, complains that the left nose cannot be cleared of mucus, which accumulates in quantity. There is almost complete nasal obstruction on the left side and some collapse of the nostril, due to old-standing facial paralysis, resulting from removal of glands from the neck. The nasal chamber appears roomy, but only the finest urethral bougie can be passed into the naso-pharynx: the choanæ by palpation appear to be free. The obstruction may possibly be due to extreme deviation of the bony septum. The anterior end of the middle turbinal has been removed without benefit. The exhibitor solicited opinions on the treatment necessary to relieve the condition.

DISCUSSION.

The President did not think one could well give an opinion on the case with the examination possible in the meeting room. He was not able to examine the posterior nares with the mirror, nor to make a digital examination.

He thought the deflected septum and swollen lower turbinal might cause obstruction as complete as that.

Dr. GRANT said he had seen two cases which very much resembled the present one, and in them there was a caseous collection in the antrum which distended it and caused the inner wall of the antrum to come so near to the septum as to completely occlude the nasal passage. On clearing out that collection the swelling subsided and the airway was restored. The present patient said she had an occasional offensive discharge from the nostril, and he thought there was some bulging in the antrum downwards, in the neighbourhood of the alveolar process. He recommended the antrum being explored with that possibility.

Dr. SMURTHWAITE agreed that one could not properly examine the case without having the nose cocainised, or adrenalin put into it. He believed there was some marked thickening of the septum and that it was cartilaginous or bony. He tested the distance on either nostril and found there was $\frac{1}{4}$ in. between the two, and the probe stopped against some hard substance. He thought it was not altogether a deflection, because there was no concavity on the opposite side.

Mr. HERBERT TILLEY said there was considerable septal obstruction, and in the treatment this would have to be removed as a first procedure. What was the source of the muco-purulent catarrh? He thought the antrum was apt to be overlooked as a source of muco-purulent catarrh, in which there was often more mucus than pus. If the antrum were drained the patient would stand a good chance of being relieved. He had recently operated upon a case with similar symptoms, and when he opened the antrum from inside the nose, he found on inserting the little finger that the mucous membrane of the sinus was swollen and that some loose body could be felt there. He pushed it into the meatus, put a snare round it, and found it was a large polypus, which came from inside the antrum. His treatment in this case would be submucous resection of the deviated septum, and he would suspect that in the antrum there was a polypoid condition. He would remove the anterior half of the inferior turbinal and make a large opening into the nose from the antrum, so that efficient and permanent drainage might be established.

Dr. H. J. DAVIS, in reply, said he did not think there was any disease in the antrum, and it had never occurred to him that it was likely. He did not think there was much more mucus on one side than on the other. Though the nose appeared to be normal in front as well as behind, yet one could not get anything through the nose except the finest urethral bougie. He thought the only thing to do was to remove the whole of the inferior turbinate. He would be sorry to remove the septum, and it would be a difficult matter. If the patient could get a free passage she would be comfortable.

Note.—The antrum has since been illuminated and tapped with a Lichwitz's trocar, and found free of disease.

Case of Functional Aphonia in a Male.

By F. de Havilland Hall, M.D.

H. M., aged 24, formerly a soldier, was admitted into the Westminster Hospital for loss of voice. There is no history of venereal disease; he is an abstainer and non-smoker. When aged 15 he had a "sore throat," accompanied with hoarseness and a dry, hacking cough. The tonsils were found to be enlarged, and were removed. The voice did not return for six to eight months, but ultimately it was completely restored.

While in India he contracted malaria. He had a second attack, lasting several months, and had not fully recovered when, in March, 1907, he caught a cold on being transferred from the plains to a hill station. The cold was followed by hoarseness and cough. The hoarseness has continued and he has an occasional dry, hacking cough; there has been neither hæmoptysis nor night-sweats, but the patient has lost weight. There has been no sputum to examine. The temperature is normal.

The vocal cords are only slightly congested; there is great loss of adduction, more pronounced on right than left side. At the left apex posteriorly the percussion note is slightly impaired and the breathing is a little rougher than on the right side.

DISCUSSION.

Sir Felix Semon said he thought it was a case of ordinary functional aphonia in a male. One was apt to forget the possibility of it occurring in males and to think of some far-fetched cause for the aphonia. He had treated one of the most stalwart men he had ever seen—a colonel in the Army—for functional aphonia, and since then he had always had in mind the possibility of it in either sex. He felt no doubt that the present was such a case.

Mr. Herbert Tilley said that some years ago, when the subject of varicose veins at the base of the tongue was being warmly discussed in the pages of the *Lancet*, the basis of discussion was a case of functional aphonia in a man, aged 33, the father of a large family, in whom cauterisation of the small venules at the base of the tongue had failed to give relief. The application of a strong faradic current at once restored the voice.

Dr. Dundas Grant said he had seen a case of similar kind treated, in a soldier, with a vigorous application of the faradic current in the neighbourhood of the larynx. The same effect might have been produced if it had been applied in any other locality.

Sir Felix Semon, commenting on Dr. Grant's remarks, advised commencing at once with *intra*laryngeal faradisation, as there was nothing more difficult or disagreeable than cases which had been dealt with by weak external applications. Much better results ensued from strong direct applications to the larynx in the first instance.

Dr. H. J. Davis said that intralaryngeal faradisation was the only treatment of any use. There was always some amount of mental perversity in these cases. Some did not speak because they would not speak, and if they got the better of you once they would try and do so again.

Dr. de Havilland Hall, in reply, said he had only seen one case which lasted as long as the present one. Many years ago he took a woman to see Sir Morell Mackenzie, and he agreed with his diagnosis of functional aphonia, advising plenty of strychnine and faradisation. She got up to ♏xij. of liq. strychninæ three times a day, and vigorous faradisation was done, but without result. She had to be operated upon for hæmorrhoids, and while she was under the anæsthetic the surgeon allowed him to faradise her as she was coming round and she shrieked vigorously, but afterwards the aphonia returned and persisted for twenty years, *i.e.*, till the time of her death. The present patient was having strychnia, and as soon as he was in a suitable condition he would have faradisation.

Case of Lupus of the Larynx and Tonsil.

By J. Dundas Grant, M.D.

The patient was a young man, and showed extensive nodular infiltration of the tonsil and epiglottis, with complete freedom from pain.

DISCUSSION.

Mr. Barwell thought the case was a typical one of lupus. He had a similar case, of very extensive nature, in a girl of about the same age, and it almost entirely cleared up under sanatorium treatment, together with arsenic in increasing doses. In such cases he recommended that that treatment should be thoroughly tried before thinking of surgical measures. Any remaining nodules should afterwards be treated surgically or with the galvano-cautery.

Dr. Grant, in reply, said he thought of using the galvano-cautery to the larynx and possibly scraping the pharynx. Tuberculin was also very good in lupus, which was the disease in which it was of most use.

Case of Functional Aphonia.

By JAMES DONELAN, M.B.

THE patient was a woman, aged 36, suffering from aphonia, which had occurred suddenly ten weeks ago. The patient was not apparently of a neurotic temperament. Attention was drawn to the long duration of the affection.

DISCUSSION.

Dr. DONELAN said the woman began sneezing on a Sunday night nine weeks ago, and at once became aphonic and had remained so ever since, in spite of the administration of strychnine and faradism. He had seen several such cases during the course of the present epidemic, and thought the toxins of influenza might cause some direct poisoning of the adductor muscles.

Dr. DE HAVILLAND HALL laid great stress on the administration of strychnine in such cases, if the patient's nervous system would respond, and faradisation. But if one failed at the first attempt there might not be another chance afforded, the case probably drifting and lasting a long time. In that case the doctor in attendance would receive some odium for causing unnecessary pain without result. The faradisation should be strong.

Mr. C. HORSFORD said he had a case of functional aphonia which lasted twenty months. She had the ordinary treatment for anaemia — change of air, strychnine and faradisation, the latter of various strengths — without any effect on the voice. When he eventually saw her he concluded it was due to some vocal fault, and as a result of breathing exercises only the singing voice gradually returned, but with increased volume and range. That voice he transformed into the speaking voice by a little exercise he gave her to bring the speaking voice back whenever she lost it. She is still in that condition and loses the speaking voice after singing, though now it returns even without the exercise if she keeps quiet for about a quarter of an hour. She was unwilling to come to the Section. He applied the faradisation intralaryngeally when he first saw her, without effect.

Dr. SCANES SPICER said many such cases got well by having the laryngoscopic mirror placed in the mouth ; and recently he had found that by making the patient breathe properly the voice could be restored in some cases without more ado.

Dr. SMURTHWAITE asked whether the treatment turned on ordinary adductor paralysis in hysteria. He found it to be more a matter of moral suasion, and he always sent the friends out. Yesterday he had a lady patient who had not spoken for a month, and she seemed unable to do anything while her husband was in the room ; she had lost her will power to contract the thyro-arytænoid interni. His plan of campaign in such cases was to try and convince the patients that they could use the voice if they would only make up their minds, and to this end he made them take a deep breath, and after each deep breath say the vowels "o," "a," "e." After this practice count up the number ten, and again back to the vowels. If the patients once found that they could say the vowel "e" the battle was won.

Dr. P. McBRIDE wondered that no one had mentioned the cold shower bath in such cases, as its effect was in some cases equal to that of intralaryngeal faradisation. In one such case which he had seen the aphonia lasted many years, but the woman had a tooth out, and while under chloroform she spoke volubly.

Sir FELIX SEMON related a case in which the patient, a lady, told him she knew he was going to put an electrode into her throat, but it would not do lasting good, because she would lose her voice again as soon as she got into the street. He applied the current and then put on his hat, informing the patient that he was coming into the street with her, to see if she lost her voice there, in which case it would be necessary to use a greater strength. Needless to say, she did not lose her voice on going into the street.

Mr. MARK HOVELL said that the few cases of this kind which did not yield to the faradic current were found usually to be suffering from uterine disease. He had known one case of aphonia suffering thirty years in this way, and the patient still got her voice for only a few weeks at a time and then relapsed for many months.

Dr. BRONNER said he used the soda water syphon, or put the patients half under chloroform, and on their coming round encouraged them to scream, telling them afterwards that they made a great noise, and thus convincing them that they could talk if they seriously attempted to.

Dr. DONELAN said, in reply, that the discussion had not touched the point he raised as to some direct poisoning of the muscles by influenza. He had had other cases in women who were not hysterical and also in men, and he thought the special treatment of the influenza should be continued to a later date than usual in addition to the local measures suggested.

Case of Extensive Epithelioma of the Epiglottis.

By J. DUNDAS GRANT, M.D.

THE growth in this case was very extensive, involving the epiglottis and half the larynx, and extending to the pharyngeal wall; there was also moderate glandular enlargement on both sides of the neck. The exhibitor was desirous of having the opinions of the Section on the advisability of operative treatment.

Mr. DE SANTI regarded the case as too extensive for operation. The glands were deeply involved, and there was a mass of disease in the pharynx and larynx. It was possible to do such an operation as Gluck had shown, but if it were his own case he would leave it alone.

A New Adenotome.

By H. J. DAVIS, M.B.

THIS instrument was obtained from abroad by Messrs. Meyer and Meltzer, and was designed by Fein. The feature of the instrument is such a curve of the shank as to bring the rotation of the instrument outside the mouth and so to allow a greater sweep of the blade behind the palate.

DISCUSSION.

Dr. BRONNER thought the top part was not curved back enough.

Mr. BARWELL said the ordinary straight instrument acted very well. Some pressure was required in the removal of adenoids, especially in adolescents, in whom they were often decidedly tough; it did not appear probable that the requisite pressure could be applied through the curved shaft of the instrument exhibited.

Dr. GRANT said that in this instrument one lost the principle of the StClair Thomson instrument, which he always used: that on bringing it up into the naso-pharynx the shank could be used against the upper incisor teeth as a fulcrum. In that way one was less liable to leave a strip of mucous membrane with adenoids on it behind. The instrument presented was obviously bent so as to keep the operator's right hand out of the line of vision.

Case of Intrinsic Laryngeal Neoplasm in a Man, aged 75.[1]

By R. SCANES SPICER, M.D.

THE patient had not been seen, until the day of the meeting, for the previous two years. During the last few months the hoarseness had returned, and the larynx presented the same appearance as on the former occasions, but there were in addition similar fringe-like masses on the opposite cord. Owing to the unusual characters of the laryngeal picture and to the doubt as to the essential significance of the condition, the case was shown before removal of the growth and further examination, and will be again reported to the Section.

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[1] Shown before the Laryngological Society of London in June, 1905, and February, 1906.

DISCUSSION.

Sir FELIX SEMON said that exceptional cases were met with which did not fit in with any prearranged formula. In the passages which he had written on this subject he expressed himself very carefully, and he wished to observe the same caution now. If he had seen the case that day for the first time he would have regarded it as malignant growth, as two years ago and even now he considered it possible that it might turn out ultimately to be malignant, despite the long history. In old people malignant disease often progressed very slowly. The only alternative, which he also previously mentioned, was mycosis. If the case were his, he would not open the larynx at present, but would again remove a piece and have it microscoped and bacteriologically examined.

Dr. MCBRIDE thought it was probably keratosis.

Laryngological Section.

April 3, 1908.

Dr. J. Barry Ball, President of the Section, in the Chair.

An Autograph Letter by Johann Nepomuk Czermak: born June 17, 1828; died September 16, 1873.

Exhibited by W. Jobson Horne, M.D.

The letter, dated December 1, 1869, was written from Leipzig. In 1869 Czermak resigned the Chair of Physiology in Jena and withdrew to Leipzig, where he was made Honorary Professor of Physiology at the University, and where he continued to reside until his death in 1873. The letter relates to a proposed visit to Sir John Simon in London, which Czermak was obliged to postpone for a month pending the completion of the purchase of the site in Leipzig upon which he built his house. In the grounds of his residence he built a private laboratory and a large hall full of ingenious contrivances for experiments and demonstrations in which to deliver lectures on physiology, and which he called the "Erklärungs-Tempel." From a perusal of subsequent correspondence it would seem that failing health did not permit Czermak to make the contemplated visit to London. The letter is written in excellent English and on English note-paper.

A Case of Infiltration of the Vocal Cord.

By James Donelan, M.B.

The patient, a married woman, aged 44, has had twelve children: the last two were stillborn, and these were followed by two abortions. There seems to be no evidence of syphilis; her husband is, however, at present in hospital suffering from some form of intestinal cancer. Some years ago she had a similar "attack of hoarseness," lasting six weeks.

associated with "bronchitis," for which she attended a chest hospital. She has little cough and no expectoration. There is dulness over both apices and some moist sounds over the right. The palate, pharynx, and larynx show marked anæmia. There is a large swelling occupying the greater part of the right vocal cord and a smaller white one, partly subglottic, at the junction of the cord and vocal process.

DISCUSSION.

Dr. DONELAN mentioned that the patient had been taking iodide of potassium for a week, and the smaller growth had now disappeared.

Mr. CLAYTON FOX thought that, so far from there being no evidence of syphilis, the fact that the patient had had two abortions was sufficient direct evidence, as also was the fact that the smaller growth had disappeared under iodide. He regarded the larger growth also as syphilitic.

Two Cases illustrating the Effects of long-neglected Adenoids on the Development of the Upper Jaws and Nasal Septum.

By JAMES DONELAN, M.B.

THE first was a girl, aged 16, from whom a large mass of adenoids was removed six weeks previously, somewhat relieving her deafness. There is marked deflection of the septum, the left middle turbinal is much enlarged and its anterior end appears to be cystic.

The second case was that of a boy, aged 11, who had always snored and had had almost complete nasal obstruction, with constant nasal catarrh from the age of 6. A large quantity of adenoids were removed two years ago. There is general hypertrophic rhinitis, and the septum presents a remarkable S-shaped bend in its whole extent.

DISCUSSION.

The PRESIDENT said he did not know why Dr. Donelan called special attention to the jaws, because he (Dr. Ball) did not think the effect on the jaws was very remarkable. If it had been, there would still remain the question whether it was the effect of neglected adenoids. That question had been discussed there before. Such defect was not found in all cases of neglected adenoids, whereas deformity of the jaw was met with where adenoids had been removed completely before the second dentition. Therefore there was some other element in the causation, and certainly heredity played a part. In the present cases the main deformity was in the septum. He thought the operation on the septum might be done now.

Dr. SCANES SPICER thought that the title as it stood was a little unfortunate, because firstly it encouraged the assumption that the adenoids were the cause of the intranasal condition, and, secondly, there was assumed to be a great deformity in the upper jaws which did not exist. In the girl the jaw was somewhat high, but the boy's jaw was one of the best he had seen. There was no irregularity of the dental arch in either case. Such cases were to be welcomed, however, because rediscussion of the subject was necessary from time to time. The nasal septum in both cases was much bent, and in the girl's case he thought the septum was pushed over by the enlarged middle turbinal. Both had hypertrophic rhinitis; there was much muco-purulent and gummy exudation. Both demanded operative interference at once. He would not at once do submucous resection, but would wash out the nose and reduce the hypertrophic condition by means of the galvano-cautery. Then he would remove any portions of the turbinals which were causing obstruction or pressure, and finally, if necessary, would do submucous resection of the septum.

Dr. FITZGERALD POWELL said he had been reluctant to perform Killian's submucous resection on the noses of children aged under 16. When they came, unless the obstruction was very severe, he had been in the habit of telling the parents to return for operation when the child had reached the age of 16 or 17. He had an idea that the operation, if done in very young children, might interfere with the development of the nose. He would like to hear what the experience of other members had been in this direction.

Mr. HERBERT TILLEY alluded to a paper written by Dr. Mosher, which appeared last year in the *Laryngoscope*, which seemed to show that deviations of the septa in children were due to irregular irruption of the central incisor teeth. Such deviations were not found usually before the sixth year. The question raised by Dr. Powell had occurred to him, and when he was in Toronto two years ago he asked Dr. Freer, of Chicago, whether he did not find that operations in young children induced some perichrondritis, regenerative callus, or other formative material which tended to obstruct the nose again. He (Mr. Tilley) had not done the operation under the age of puberty more than two or three times, and the manipulation was more difficult than in the adult because of the smaller space in which one had to work. He could not say whether in those cases the growth of the nose had been interfered with subsequently.

Dr. F. H. WESTMACOTT said he had had many such cases at the Children's Hospital at Pendlebury, and he had a collection of ten children, whom he proposed to show at the next clinical meeting in Manchester. His usual practice was to do partial resection of the turbinal bones, and note the effect on the nasal passages and on respiration. If that was insufficient, he did a Killian operation on the septum, and in only one case had he found any difficulty afterwards. The operation in children was not as easy as in an adult, but he did both in the same way, with the head over the end of the operating table. In two or three cases there had been a good deal of swelling and thickening afterwards, and in one case, done twelve months ago, that swelling persisted for three or four months. He had not since had a case in which there was any obstruction after the operation for a time varying from two to three weeks. So far as he could judge from the outside, there had been no interference with the development of the nose after the operation.

Dr. L. H. PEGLER said he had employed Moure's method two or three times for children under 6 when there was such complete obstruction on one side that a probe could not be passed and the child was suffering very great disadvantages. If only to make it possible for air to pass, and thus tend to equalize the atmospheric pressure, the operation was worth doing. In one case especially, that of a litle boy, the result had been excellent. The last case of the kind he had had was one of complete left-sided obstruction in a tiny girl, and he was fairly satisfied with it; the septum was very elastic, and had come back somewhat into its old place, but much more room was established than before the operation; and though more would have to be done later on, he felt that the temporary operation had been quite worth doing. He preferred to do this simpler and quicker operation on a very young child rather than submucous resection.

Mr. HAROLD BARWELL said he would deprecate any resection of the turbinals in young children, as it was more harmful in young children than in adults. He also agreed as to the difficulty of resection of the septum in very young children, and after the operation there was not as much room as there appeared to be immediately the operation was completed. One case upon which he did it recently had now a good deal of thickening of the septum and considerable return of the obstruction, though there was, of course, more room now than before the operation was begun. He would be interested in seeing whether the thickening would disappear in a month or two.

Dr. DONELAN, in reply, said he wished to particularly point out the great height of the maxillæ, the long faces and narrow nasal cavities in both cases. He thought he should refrain from doing turbinectomy in any growing person. He had no doubt it would free the nose, but the consequences would probably be even less satisfactory than the present condition. He would operate in the case of the girl shortly, but would try the cautery, as had been suggested, in that of the boy.

Two Radiographs to illustrate the Value of the X-rays in sounding and washing out the Frontal Sinus.

By STCLAIR THOMSON, M.D.

WHEN unprovided with the X-rays it is usual for us to depend upon the direction taken by the cannula to decide whether the frontal sinus has been entered or not. In the first photograph it will be seen that the point of the cannula passes up towards the frontal sinus and that the portion of it outside the anterior nares lies flat against the upper lip. These two points might make us think that the frontal sinus had been certainly entered, particularly when pus could be washed out, as it was in the case to which this photograph refers. But on the screen, as shown in the photograph, it will be seen that the cannula had not entered the fronto-nasal duct, but had passed up into an anterior ethmoidal cell, and that its point was pressed against the floor of the anterior fossa of the skull. It will readily be recognized that any roughness in manipulation in this area might have serious results.

The second photograph shows the same case, with the same cannula, where the instrument was, with the help of the X-rays, securely guided up into the centre of the frontal sinus.

DISCUSSION.

Mr. HERBERT TILLEY asked whether members who were in the habit of passing probes into the frontal sinus had any difficulty in knowing when the probe had or had not entered the sinus. He thought that when a sinus was diseased it could generally be entered more easily than when healthy, and it could be felt to touch something soft on a hard surface, and the probe rested in a certain position against the upper lip. He thought it could scarcely be maintained that an X-ray apparatus was advisable whenever one wished to probe or to wash out a frontal sinus.

Dr. WESTMACOTT said that often in such circumstances the patient would tell whether the probe was there, more especially if a cannula were passed and the sinus inflated.

Mr. CHICHELE NOURSE agreed that the diseased sinus was more easily entered than the normal one. With a sufficiently well curved cannula one could easily tell whether it was in the frontal sinus if another instrument with the same curve were placed outside the nose parallel to the first. In passing a probe into the frontal sinus it often happened that the point accidentally engaged in an anterior ethmoidal cell. In that case the handle of the instrument projected more horizontally, instead of being down against the edge of the nostril.

Dr. WATSON WILLIAMS said it was true that in some cases one could be sure of being in the sinus by laying a similar instrument outside; but there were other cases in which the matter was less clear, and in such cases he thought the skiagram must be of inestimable service. Dr. StClair Thomson's point was a very valuable one in cases which were open to doubt, and he had come across some of these in his own practice. In this case in particular the probe, although it had entered only an ethmoidal cell, as proved by the skiagram, would otherwise have been considered by all ordinary signs to have certainly entered the frontal sinus.

Mr. CLAYTON FOX said that in the general run of cases no one doubted whether the probe was in the frontal sinus, but in the cases where there had been cause to remove the anterior half of the middle turbinate, it was reasonable to try and hunt for more than one opening into the middle meatus. In the cases where there was an anterior ethmoidal cell for the probe to pass into, the frontal sinus opened into the middle meatus, and the infundibulum opened into the anterior ethmoidal cell; therefore it was wise to look for some opening other than the infundibulum.

A Case of Thyro-lingual Fistula treated by Electrolysis and Excision.

(With Microscopic Sections.)

By J. Dundas Grant, M.D.

Dr. Dundas Grant said the present was the third time the patient had been operated upon. The first operation was done by a well-known and skilful surgeon, but recurrence took place. In the second operation, done by himself, the result seemed at the time to be good, but in two years distinct recurrence had ensued. On the third occasion he determined to have the lining electrolyzed, and inserted a platinum needle, which he pushed up to the hyoid bone, while Dr. Lewis Jones carried out the electrolytic process. Dr. Grant then proceeded to dissect out the sinus. That time the operation was successful. The last operation on the present case was done in 1906, and there were no signs of recurrence. In the case which he showed with Dr. Mackenzie it would have been impossible to introduce the needle as it existed, but after the tube had been exposed and straightened it might have been done. If he had another such case, however, in which he could pass a platinum needle through the sinus, he would try the effect of electrolyzation without dissection. In the present case he did not know which contributed most to the cure.

Case of Polypoid Growth (Lymphangeioma) of the Larynx.

By H. Betham Robinson, M.S.

The patient, male, aged 45, was sent to St. Thomas's Hospital for hoarseness, which had been increasing for the past five years; this was stated to have followed a blow over the larynx. There was no pain, but there was a slight amount of dyspnœa. Independently of this his health recently had not been good; there were loss of weight, marked tremors, sweating, and increased pulse. It was considered that he was suffering from Graves' disease, but there were no eye signs and no enlargement of the thyroid gland; there was strong suspicion of alcoholic excess.

Laryngeal examination showed a polypoid growth, about the size of a small plum-stone, attached in the anterior commissure to the under surface and edge of the left vocal cord. It was of a pinkish colour and looked granular on the surface, but did not appear ulcerated. The appearance generally of the vocal cords was normal; their movement was natural except that there was some mechanical interference on phonation. The rest of the larynx was healthy. Externally the laryngeal skeleton was normal, and there were no enlarged glands.

The growth was removed under chloroform through a Killian's tube with forceps. The very narrow pedicle was seized and it came away easily.

Histologically the growth was of a type very rare in the larynx. Its groundwork was fibrous tissue, which was traversed by large dilated lymphatics containing lymph coagula. The epithelial covering was regular and normal, except at one spot where there was a microscopic papillary elevation, and this showed nothing suggesting malignancy.

Since the operation he has been in every way very much better in health, and his laryngeal symptoms have disappeared.

A Case of Intrinsic Neoplasm of the Left Vocal Cord in a Man, aged 76.[1]

(With Microscopic Specimen.)

By R. H. Scanes Spicer, M.D.

This case, which is interesting on account of the unusual and suspicious appearance of the growth, and the advanced age of the patient, was operated on, as before, with Mackenzie's laryngeal forceps under cocaine. The growth was completely cleared out at one sitting in about five fragments, and a loud but hoarse voice at once replaced the previous aphonic attempt. The masses, as before, resembled bright white shining clumps of Iceland spar or the surface of coarse tripe, and their site of attachment was comparatively small over the front half and above the left vocal cord. There was a smaller fringe over the right vocal cord. The preliminary pathological report states that papillomatous tissue only is found and no malignant invasion.

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[1] Shown before the Laryngological Society of London in June, 1905, and February, 1906, and before the Laryngological Section in March, 1908 (*Proc. Roy. Soc. Med.*, i., No. 6, Laryn. Sec., p. 81).

Mr. DE SANTI said the microscopical evidence in the case bore out the impression that it was not malignant but was papillomatous. Now that the growth was removed one could see the larynx well. There were one or two white points still left on the cord, but there was absolute mobility of both cords. He did not think the specimen showed, microscopically, that it was epithelioma, though there were some pearl nests in the section.

A Case of Subglottic Laryngeal Tumour.

By A. STANLEY GREEN, M.B., and H. LAMBERT LACK, M.D.

THE patient, a woman, aged about 56, has been hoarse for six years and has signs of phthisis at both pulmonary apices. For the last eighteen months her voice has been in the same condition as at present. She has been treated by a complete rest of the voice and with large doses of iodide of potassium without improvement. There is a smooth red growth springing from the posterior wall of the larynx below the vocal cords. The exhibitors were inclined to consider it a tubercular tumour.

DISCUSSION.

Dr. STANLEY GREEN said there was practically no definite history of syphilis, except that she had had six miscarriages, and there was definite evidence of tubercular disease of the lungs, as shown by X-ray examination, and she reacted very smartly to Calmette's test. But the growth was there before the deposit in the lungs was detected, and the question was what the swelling below the vocal cords was due to. It was hard and did not pit on pressure.

Dr. WATSON WILLIAMS said he understood the symptoms had been present six years, which rather suggested enchondroma. It was a very long time for a tuberculous lesion to exist.

Dr. DONELAN said that when he saw the larynx it was very congested, probably from coughing, and he thought in view of the long history and the general condition of the patient the swelling was an inflammatory product, probably fibroma.

Dr. GRANT said he thought the growth was probably cartilaginous, but it was a beautiful case for examination and even treatment by direct tracheoscopy. It could be easily illuminated, and the growth might be removed, in whole or in part. The patient said it was a great annoyance to her; and he thought the growth, by interference with the movements of the arytænoid cartilages, although rather below their level, was interfering with the voice. She would not be worse even if the operation were not completely successful. The other alternative would be to do thyrotomy and get at the growth from the outside.

Dr. FitzGerald Powell said that from its appearance he did not think it was tuberculous. It was not possible to give a definite opinion as to its character. From its appearance, and from the length of time it had existed, he thought it must be a benign neoplasm. He did not think it could be removed by interlaryngeal methods or through a Killian's tube. He would prefer an external operation, a high tracheotomy and splitting the cricoid. The growth was interfering with the voice and some operation should be done.

Dr. H. J. Davis said the growth would be found to be larger than it appeared to be, looking at it from above. He did not agree that it was an inflammatory condition. If it had been the result of chronic inflammation there would have been redness of the cords, whereas both were white.

Dr. Dan McKenzie said that it would not be wise, in the face of the tuberculosis in the lungs, to inflict a wound in the larynx in an endeavour to remove the tumour, particularly since there was no serious interference with respiration.

Mr. Clayton Fox said that some years ago, at the Central London Throat and Ear Hospital, he saw a similar case in an older patient—a growth of the same size and shape, and in the same area. It was treated by first snaring off with a galvano-cautery snare, and afterwards applying lactic acid. Pathological evidence showed it to be tubercular.

Dr. Green, in reply, said the question was whether it was wise to interfere with a patient who had tubercular mischief in the apices of both lungs, and whether sufficient trouble was caused to the patient to justify that risk. It was not clear exactly what would be the best proceeding.

A Case of Infiltration of the Nasal Cavities.

(With Microscopic Specimen.)

By Charles A. Parker, F.R.C.S.Ed.

The patient, a man, aged 50, had influenza in February, 1907, after which he noticed a clear, watery discharge from the nose and some nasal obstruction. The obstruction has gradually increased until it is now practically complete.

On examination both sides of the septum are found to be greatly but irregularly thickened, and the middle and inferior turbinals on both sides are much enlarged and have a nodular appearance. In some parts the enlargement is firm and solid to the touch, whilst in other parts it is of polypoid consistency. There is also some thickening on the floor of the nose. By posterior rhinoscopy the turbinals are seen to be enlarged and of firm and solid appearance. The posterior end of the septum shows no change. Both maxillary antra are quite bright on transillumination, and there is no sign of bulging of any accessory sinus.

A portion of the infiltrated mucous membrane was removed from the left middle turbinal, and has been reported to be a spindle-celled sarcoma. Clinically, however, the case does not suggest sarcoma, and there is room for doubt as to whether the microscopic appearances definitely point to the infiltration being of this nature.

DISCUSSION.

Dr. PEGLER said that in the present case the microscope did not help very much ; the tissue belonged to a class of growth which for convenience was called soft-celled fibroma, and which, though often diagnosed as sarcoma, had no relation to that disease. The man admitted having had syphilis thirty years ago, and he had had cases, of which this one reminded him, which had improved under iodide of potassium, but there were no vessels in the present section which showed the characteristic thickening of endarteritis, a fact which was not in favour of syphilitic change.

Dr. WYATT WINGRAVE said he did not think the specimen was a spindle-celled sarcoma. There was considerable lymphocytic infiltration, with many endothelial cells, which evidently belonged to blood-vessels. It was more of the nature of a granuloma, and the activity of the epithelioid cells was strongly suggestive of either lupus or rhino-scleroma ; but in the absence of characteristic hyaloid bodies the latter was doubtful.

Mr. PARKER, in reply, said he did not think the man had had syphilis thirty years ago. On being questioned, he said he had had a very slight running, but he denied having had a rash or sore throat. The growth was mainly in the outer wall of the nose, and both the inferior and middle turbinals were infiltrated.

The specimen was referred to the Morbid Growths Committee.

A Case of Suppurating Hæmatoma of the Septum Nasi, with a Fistulous Opening in the Gingivo-labial Recess.

By DAN McKENZIE, M.D.

THE patient, a man, aged 21, received a blow straight on the end of the nose seven weeks ago while boxing. Swelling of the nose, upper lip, and eyelids followed, and lasted about a week. The nasal respiration was obstructed from the outset by swelling of the septum.

About five weeks before he came to hospital the patient observed that, when the swelling inside the nose was compressed, pus flowed into the mouth.

On inspection, both nostrils were seen to be occluded in front by a septal swelling, tender and fluctuating. On opening the mouth a fistulous opening discharging pus was seen in the gingivo-labial recess, to the left of the frænum of the upper lip; through this opening a fine probe could be inserted for a distance of 1¼ in., passing into the abscess cavity in the nose. The abscess was opened by a free incision through its antero-inferior wall in the left nostril and lightly packed with gauze.

DISCUSSION.

The PRESIDENT said it was not usual for an abscess of the septum to open in this situation. He had not seen an instance of it before.

Dr. McKENZIE, in reply, said the probability was that the pus had tracked down from its seat in the septum. It seemed to get down under the periosteum of the upper jaw, above the alveolar process. He supposed that in such cases the pus did not track backwards under the periosteum of the vomer because there was discontinuity of space between the muco-perichondrium and the periosteum.

A Case of Bilateral Swelling of the Septum Nasi.

By PHILIP DE SANTI, F.R.C.S.

THE patient was a youth who has complained of variable *nasal obstruction* for the last four years. Six to seven months ago this condition became aggravated and pain was noticed across the bridge of the nose; this pain has increased of late and the obstruction to nasal respiration has become more marked. On examination two weeks ago, when the patient was first seen, a bilateral red swelling was found on the septum nasi, tender to touch and soft to the probe. Swelling of middle turbinals and cartilaginous ridges on lower part of septum also noticed. No history of injury, no signs of congenital syphilis. Incision into the swellings on two occasions showed no signs of pus. The condition remains *in statu quo*.

DISCUSSION.

Dr. WATSON WILLIAMS said it might be a case of congenital syphilis, in spite of the meagre signs of that disease, and the appearance of the teeth suggested to him that this might be the diagnosis. The appearance of the nose might also fit in with that idea. He suggested that iodide of potassium should be given and its effects watched.

The PRESIDENT said he thought of syphilis when he saw the teeth, but there was a very long history of obstruction—four years—and no evidence of any destructive process.

Mr. HERBERT TILLEY suggested that it was an ordinary chronic nasal catarrh, with deviated septum, in which both sides of the septum were hypertrophied, and that an ordinary submucous resection would relieve all the symptoms.

Dr. PEGLER believed, with Mr. Tilley, that this was a case of catarrhal rhinitis, with a good deal of thickening of the septum. As in many of the nasal cases shown at the meetings, one would like to examine it under the effects of a weak cocaine spray.

Mr. DE SANTI, in reply, said the point of interest was the fact that the patient had a symmetrical swelling of the septum. The condition also was very tender; any manipulation with the probe inside the nose, or pressure outside the nose, caused pain, and that symptom was of recent origin, within five weeks. On passing a probe under cocaine the swelling was found to be very œdematous. He was not satisfied as to its nature. Possibly it might be due to nasal catarrh, but his view had been that it was congenital specific trouble. He had been giving iodide of potassium for three weeks, but there was no apparent improvement. He would report the case again later.

A Case showing Bony Outgrowths from the Maxilla and Mandible.

By W. H. KELSON, M.D.

THE patient, a man, aged 30, first noticed the condition eight years ago. He presents symmetrical outgrowths from the nasal processes of the superior maxillæ, and one from the mandible on the left of the middle line. There is great bony enlargement of the inferior turbinals, which press on the nasal septum.

DISCUSSION.

Mr. H. B. ROBINSON said he thought it was a case of leontiasis ossea, a form of chronic overgrowth of bone, the origin of which we know very little. The patient seemed to have had it a long time, so that probably there could be no suggestion of syphilis; but he asked whether Dr. Kelson had tried iodide of potassium. Two years ago he showed at the Clinical Society a boy with a curious overgrowth of the bone of the lower jaw and enlargement of the clavicle. Previously for some time he had been given iodide of potassium and hyd. cum cretâ, but no difference was observable. But during the last six months he had started that treatment again, and it was now beginning to clear up; but whether the treatment was now the cause of it doing so was doubtful, for if the condition were syphilitic, it was curious it did not resolve before.

Dr. McKenzie regarded the case as typical leontiasis ossea; the beetling forehead, bossy protuberance on the mandible, and huge cavernous mouth went to form the typical picture of the condition. There was a skull in the College of Surgeons Museum which exactly exemplified the condition of the nasal passages in this case, the bony outgrowths from the lateral wall of the nose having totally obliterated the two nasal cavities.

Dr. Westmacott said there was a decided boss on the right side of the mandible also. The malar processes were also undergoing enlargement.

Dr. Jobson Horne referred to specimens in the pathological museums of London similar to the condition shown. He considered that carefully ascertained histories of such cases, especially in regard to their onset being insidious or associated with acute nasal symptoms, would be of the greatest help in elucidating the etiology of the condition. The difficulty in obtaining accurate clinical histories of cases of long standing not associated at any time with any appreciable amount of suffering was well known. At times the patient after further consideration was able to throw important light on his case. He hoped that Dr. Kelson would supply any further clinical facts he might be successful in eliciting.

Dr. Pegler thought it was going rather too far to call such a case typical leontiasis ossea.

Dr. Kelson, in reply, said he had gone very carefully into the history, and it excluded syphilis. He had not given iodide of potassium. The condition did not seem to him to be typical of anything; it seemed to resemble the bone disease which occurred on the Ivory Coast of Africa, as figured by Bland-Sutton and others. The jaw was dull to transillumination on both sides. The onset was exceedingly gradual, and there was no pain whatever; indeed the man said he did not know of the swelling on the left side of the jaw until he (Dr. Kelson) pointed it out. He did not consider it leontiasis ossea, the cranium not being affected.

A New Instrument for passing a Suture through the Epiglottis.

By Cyril Horsford, M.D.

By means of this instrument a suture can be rapidly and easily passed in order to facilitate intralaryngeal operations according to the method advocated by the exhibitor at the meeting of the Laryngological Section in December, 1907.[1]

The instrument was shown in practical operation during the meeting.

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[1] At this meeting Dr. Horsford brought a patient with a markedly overhanging epiglottis and demonstrated the method (*Proc. Roy. Soc. Med.*, i., No. 3, Laryn. Sec., p. 24).

DISCUSSION.

Dr. DUNDAS GRANT said he had had an opportunity of trying the instrument, and found it acted splendidly; he thought very highly of it.

Dr. H. J. DAVIS said that Dr. Horsford passed the instrument on the patient he (Dr. Davis) was exhibiting with a growth on the vocal cord, and it was done very quickly. He thought the needle should be passed nearer the tip of the epiglottis; if passed near the base it must buckle up the epiglottis as soon as traction was exerted, as it did in his case. That buckling of the epiglottis was not a very important matter, but it concealed the sides of the larynx.

Dr. SCANES SPICER congratulated Dr. Horsford on the instrument; it would be of very great use. One might be passed on each side of the epiglottis; it might also be used for the soft palate, to pull it forward, and for the tongue.

Mr. STUART-LOW also congratulated Dr. Horsford. He said he expressed his appreciation of it the first time it was shown, when it was not received with much favour.

Dr. FITZGERALD POWELL said he had not heard it ridiculed, but perhaps the best compliment to Dr. Horsford was implied in the danger that, being so easy of use, it might be employed oftener than was really necessary.

Dr. HORSFORD, in reply, said the method was now quite simple, and there was no discomfort or danger to the patient. In regard to the principle of suture, he recommended it because, though his experience had been limited to a few cases, he had been so impressed with it that he thought it should be used in the majority of intralaryngeal operations. He did not see why it should be limited to cases of overhanging epiglottis. On the following day he would be operating for a singer's node, and he intended to use the instrument, as he felt it was his duty to adopt every means at his disposal to facilitate so difficult an operation and minimize the risk of ruining the voice of a professional singer. Though Sir Felix Semon had been able to find mention of the method and of a similar instrument in a German book of thirty or forty years ago it was probably buried there. The method, however, was quite original so far as he was concerned, and new to this country. The instrument is a modification of another used in gynæcology.

A Case of Growth on the Left Vocal Cord.

By H. J. DAVIS, M.B.

THE patient, a man, aged 26, suffers from hoarseness of three months duration and from nasal discharge. There is a tumour, having the appearance of a fibroma, at the junction of the posterior and middle thirds of the left vocal cord.

Dr. DUNDAS GRANT agreed that it was a small fibroma, and its removal would not be very difficult. But he doubted whether that little growth, situated at the under surface of the cord, was the sole cause of the hoarseness. He believed this was to a great extent due to the chronic laryngitis.

A Case of Cyst on the Floor of the Nose.

By H. J. Davis, M.B.

The patient, a woman, aged 50, has suffered from right nasal obstruction for two years. There is a fluctuating cyst on the floor of the inferior meatus extending under the inferior turbinal and expanding the nostril. The patient complains of pain at the tip of the nose. No treatment has as yet been adopted.

DISCUSSION.

Mr. H. B. Robinson said he felt no doubt that the cyst was of dental origin, in connection with the right canine, which was in a very bad condition. The patient said she had had swelling over the root of this tooth from time to time for years.

Dr. McKenzie asked whether it might not be a sebaceous cyst of the vestibule.

Mr. Clayton Fox said his first thought was of sebaceous cyst, but on careful probing there was so much resiliency in the growth that that idea was excluded. In regard to the small sinus in connection with the carious tooth, possibly it might be a cyst containing purulent material, but he thought it was more vascular or nævoid. One could not be certain without exploration.

Case of Chronic Suppurative Pansinusitis, in which Killian's Complete Operation was performed on the right side and on the Anterior and Inferior Walls only on the left side.

By Herbert Tilley, F.R.C.S.

Dr. T., aged 35, had suffered from a profuse purulent nasal discharge for two years; he used from six to seven handkerchiefs a day. The discharge was very foul, but this was only noticed by the patient's friends. He did not suffer from headache, but a slight feeling of tension over the lower forehead. The maxillary antra were operated on in May, 1907, by a provincial surgeon.

February 12, 1908: Mr. Tilley performed a complete Killian operation on the right sinus.

March 4, 1908: The anterior wall and floor of the left sinus were removed. The wounds were sutured in their entirety, with the exception of the outer angles, where a small drainage-tube was inserted and ran inwards for the length of the sinus. The upper regions of the nasal cavities are now quite free from pus. A skiagram of the sinuses was shown, which illustrates very clearly their size, the presence of septa and loculated chambers.

DISCUSSION.

Mr. STUART-LOW said the result was good, as no pus could be seen in the upper region of the nose, but it was a pity that the external mark was so evident; in the case of a lady this would be objectionable. Some time ago he showed four cases, the success of which in minimizing disfigurement he attributed to the avoidance of pressure from the bandage; this he did by simply putting on a shield, having india-rubber edges, and bandaging over it. The shield acted as a Bier's band, and thus hastened union. Healing took place by first intention, and the wound was always stitched up at once. In the inferior meatus at the back there was much congealed pus, and he asked the reason why. He was told there had been a radical antral operation, but he presumed this was not performed in the way he had described at the last meeting, when he showed cases illustrating its success, viz., by what he had called the "open" method, in which stitching and syringing were discarded.

Mr. HERBERT TILLEY, in reply, said he showed the case to illustrate the fact that the complete Killian operation was a better method than the incomplete one. He did two operations on the same patient, and his reason for the incomplete one on the left side was that there was very little ethmoidal disease there. He sutured the wounds entirely at the close of the operation, except a small point at the outer angle of the eyebrow, where a fine drainage-tube was passed through the sinus as far as the fronto-nasal canal. He was not responsible for the slight antral suppuration at the present time; he believed it was due to the fact that the whole mucous membrane from the antrum had been removed and its place taken by granulation tissue, which not only suppurated now, but would do so for ever unless it became covered with normal epithelium.

Laryngological Section.

May 1, 1908.

Dr. J. Barry Ball, President of the Section, in the Chair.

A Series of Stereoscopic Photographs of Patients operated on by various methods for Disease of the Frontal Sinus.

By W. S. Syme, M.D.

(1) *Killian's Complete Operation on the Left Side.*—The incision has healed so well that it is hardly visible. The frontal sinus, anterior and posterior ethmoidal cells and the sphenoidal sinus were operated on by way of the external opening. Though the disease was extensive, the discharge had ceased at the end of seven weeks. The sphenoidal sinus and posterior ethmoidal cells of the right side, which were also diseased, were attacked through the anterior nares, and the Caldwell-Luc operation was performed on both antral cavities.

(2) *Incomplete Killian Operation on the Left Frontal Sinus and Ogston-Luc Operation on the Right Side.*—There was extensive disease of all the accessory nasal cavities, which was treated by radical methods. The discharge ceased only after some months.

(3) The same case as (2) after paraffin had been injected to reduce the deformity.

(4) *Incomplete Killian Operation on the Right Frontal Sinus.*—All the accessory cavities were diseased except the left frontal sinus, and were treated by radical methods. The operation on the right frontal sinus was followed a week after by severe orbital cellulitis; a drain was introduced through the outer end of the incision, which afterwards healed by granulation. Some inability to raise the upper lid remains. The case

was operated on in January last and the discharge from the right side has now almost ceased.

(5) *Ogston-Luc Operation on both Frontal Sinuses.*—There was severe disease of all the accessory nasal cavities, which was dealt with radically. It was thought that the left frontal sinus was not affected, but on opening the right sinus it was found that the septum between the two was destroyed. The left sinus was dealt with in a manner similar to the right, but no opening from it into the nose was found; both cavities were therefore drained by way of the right nostril. The exhibitor afterwards became convinced that this was a mistake. The discharge from the right side ceased only after a considerable time.

(6) *X-ray Negatives of the Frontal Sinuses in a Case of Suspected Disease of the Right Frontal Sinus.*—The anterior ethmoidal cells were diseased and have been dealt with by the intranasal route. A metal catheter has been passed along the right infundibulum. These skiagraphs were taken before the operation on the ethmoid.

Specimens from Cases of Sarcoma and Cases simulating Sarcoma in the Upper Air Passages.

By W. Jobson Horne, M.D.

(1) A section of a growth from the outer side of the nose and near the inner canthus of the eye, reported to be histologically a fibro-sarcoma. After removal there was no recurrence of the growth, and the case was clinically an innocent tumour.

(2) A section of a vascular growth removed from the anterior part of the cartilaginous septum of a girl aged 16. The clinical facts suggested sarcoma, but on removal microscopical examination showed the growth to be innocent (bleeding polypus).

(3) A section of an intranasal growth. Endothelioma (alveolar sarcoma).

(4), (5), (6), and (7) Sections of fibro-angeiomata removed from the naso-pharynx.

(8) A section of a mixed-cell sarcoma of the larynx.

(9) Endothelioma (alveolar sarcoma) of the larynx (extrinsic). The growth remained localized. The patient died from broncho-pneumonia. Post mortem no glandular involvement was found.

Dr. JOBSON HORNE said that on a previous occasion he had expressed his opinion that sarcoma in the upper air passages was more often diagnosed than it existed, the regions lending themselves to the development of vascular neoplasms of an embryonic structure. The histological findings often supported a diagnosis of sarcoma, whilst the clinical course of the case was that of an innocent neoplasm. Therefore a negative report on the question of sarcoma in these regions from a pathologist counted for more than a positive one, unless the pathologist were fully acquainted with the clinical facts of the case. By the elimination of the endotheliomata and the fibro-angeiomata the number of alleged cases of sarcoma had been reduced. The specimens exhibited were from types of cases, and served to illustrate those points. In each case the question of sarcoma was raised either by the pathologist or by the clinician. The cases came under observation as far back as ten to six years ago; he was therefore in a position to state the subsequent history in eight of the nine cases—which was innocent.

A Case of Mucocele of the Anterior Ethmoidal Cell of the Left Side which has been opened from the Nose.

By DAN MCKENZIE, M.D.

THE patient, a man aged about 35, first noticed a swelling at the inner side of the left orbit fourteen months ago. Seeking relief at the Royal Ophthalmic Hospital he was admitted as an in-patient, and was kept under observation for ten days. The nasal duct was explored under chloroform, but nothing in the way of active interference with the tumour was undertaken. Nevertheless the swelling gradually subsided and remained absent for a year.

Ten days ago it again appeared, the patient awaking in the morning to find the tumour. He returned to the Royal Ophthalmic Hospital, and was referred to the Central London Throat and Ear Hospital, where he came under the exhibitor's care.

On examination a small bulging was felt over the situation of the left lachrymal bone, tense and cystic in character. The eyeball was displaced slightly outward, but there was no diplopia, although the patient stated that it had been present at an earlier date. Anterior rhinoscopy showed a bulging in the region of the middle turbinal. This proved to be the nasal segment of the cyst. The anterior wall was broken down by Grünwald's forceps and snared so as to open the cyst freely. The contents consisted mainly of mucus, with a few leucocytes. Dr. Wyatt

Wingrave reported that the wall of the cyst was composed of thin bone lined with flattened spheroidal epithelium.

After evacuation bi-digital examination showed that the bone of the inner wall of the orbit had undergone pressure atrophy, leaving a circular, smooth-edged hiatus about 1 cm. in diameter. Through this hiatus the cyst bulged, and, according as it filled and emptied, appeared and disappeared as an orbital tumour.

DISCUSSION.

Dr. DUNDAS GRANT said he saw the case before it was operated upon, and the result was extremely good. It explained well the necessity for attacking such cases through the nose.

Mr. KELSON asked where the pus in the nose was now coming from. The man said there was still a good deal of discharge.

Dr. McKENZIE, in reply, said he thought the discharge was probably coming from the interior of the cyst. He did not entirely remove the nasal segment, so that members might see the condition. He proposed to lay it open still further and remove the floor of the cyst, when he hoped all discharge would cease. The present discharge might be due to the retention of some secretion in the cyst. He did not think there was any purulent disease in the ethmoidal labyrinth. He was indebted to Dr. Grant for having advised him to operate through the nose and for having put him right in regard to the bulging of the wall of the nose, which he (Dr. McKenzie) had taken to be the middle turbinal.

Case of Large Post-nasal Polypus simulating a Naso-pharyngeal Fibroma growing from the Antrum of Highmore.

By J. DUNDAS GRANT, M.D.

THE patient, a young girl, complained of complete left nasal obstruction. Posterior rhinoscopy revealed a smooth, pink, rounded tumour occupying the whole naso-pharynx; on palpation it was firm in consistence, and could be traced to the back of the left choana. On rapid palpation it appeared to be adherent to the internal pterygoid plate, but its more complete examination was deferred until a general anæsthetic was administered. It was then possible to push the tip of the left index finger between the growth and pterygoid plate and to feel the edge of what appeared to be an orifice in the bone opening into the antrum. The little finger introduced through the anterior nares could distinctly touch the anterior margin of such orifice, the inferior turbinated body having either shrunk or been displaced upwards. An ecraseur with a very coarse wire was introduced through the nostril into the naso-pharynx, and the tumour was guided by the index finger into the loop, which was tightened up to such an extent as to grip the tumour near its site of origin without cutting it through; it was then forcibly evulsed, bringing with it an elongated peduncle. On palpation the orifice leading into the antrum was now unmistakable; a curved curette was introduced into it through the anterior nares, and as complete scraping as was possible was carried out. Should recurrence take place Dr. Grant proposed that the antrum of Highmore should be opened, if possible by enlargement of the existing orifice, or else through the canine fossa. This case is an addition to the series of similar cases already exhibited by Dr. FitzGerald Powell, Dr. Tilley, and Dr. Dundas Grant.

DISCUSSION.

The PRESIDENT (Dr. J. Barry Ball) asked how the case had been operated upon and what had been made out as to the origin of the polypus. Killian and others had maintained that solitary large polypi at the back of the nose generally grew from the antrum. He had often noticed in extracting such polypi that there was quite a long pedicle, and when he read Killian's paper it interested him very much, because it seemed to explain why they sometimes had such long pedicles.

Dr. P. MCBRIDE asked whether Dr. Grant was certain that the tumour came from the antrum. It seemed exactly to resemble many which he had removed. On anterior rhinoscopy it was difficult to see anything unless the nostril was wide enough to allow one to see the posterior mass. In those cases after removal there was always a long pedicle left, as in the present case. He knew that Killian and an American author, who wrote in French, pointed out that those growths came from the antrum. He believed that Killian was able to pass a hook round the pedicle which he saw growing out of the antrum, and he believed the American author opened the antrum and saw a pedicle growing out. He understood Dr. Grant could not see the growth from the front, so that his statement was probably more assumption than certainty.

Dr. FITZGERALD POWELL thought that it was an ordinary mucous polypus, cystic in character, and growing by a pedicle. It was difficult to suppose that a soft lobulated polypus in the antrum could cause absorption of the healthy inner wall of that cavity and make its way through into the nose, and thence spread itself out into the large mass hanging by a narrow pedicle which Dr. Grant had exhibited. He did not know if this was the view Dr. Grant had taken of the mode of exit of the growth, or whether he thought it came through the natural ostium; this was possible when the polypus was very small. In the case of large, fibrous, dense growths the case was different: he had himself removed a large fibroma originating in the antrum which by its pressure had caused absorption of the posterior third of the inner wall of the antrum and made its way into the nose and naso-pharynx; it and the opening made could be plainly felt by the finger passed into the posterior choana.

Dr. StClair Thomson said that last week he had the opportunity of looking at Zuckerkandl's original anatomical preparations with von Eicken, Killian's assistant. The sections were cut so that the antrum cavity could be seen on the one side and the nose on the other. When he looked into the antrum and did not see the polypus starting from its walls, he said to von Eicken that Killian was surely mistaken. But that authority maintained that the polypus grew very close to the ostium. When one looked into the antrum only the edge of it could be seen. Killian did not claim that they always grew out of the lining membrane of the antrum itself, but close to the ostium, whence they were dragged backwards.

Mr. Stuart-Low said that he also had asked Killian about that point particularly, as he was somewhat mystified. He saw Killian remove a very large one that had originated in the antrum. These polypi commenced growing in the antrum and passed through the ostium when very small and young, and then gradually grew, and as this took place the pedicle or stalk was drawn out and the mass of the polypus passed backwards into the naso-pharynx.

Mr. Clayton Fox said that he had such a polypus to deal with; in that case the pedicle was ¾ in. long, and seemed to spring from a very large orifice behind and below the usual antral opening, *i.e.*, through an accessory ostium. He passed a probe in and made out the foramen to be almost 1 cm. in diameter. The polypus was removed with the cold snare, and when the patient put his head forward quite 2 dr. of clear serous fluid escaped. He believed Killian remarked that fibroid changes could arise through inflammation subsequent to the passage of the cyst through the opening.

Dr. Dan McKenzie said he could amply corroborate Dr. Grant's account regarding the site of origin of the tumour. While the patient was on the operating table he had passed his little finger into the nose and had hooked it into an opening leading into the antrum such as Mr. Clayton Fox had described. It lay well behind and below the natural ostium, and he could distinctly feel the pedicle of the tumour passing into the antrum and seemingly adherent to its posterior wall.

Mr. Kelson said that in reference to Dr. Powell's remark as to the difficulty of a polypus coming through the opening in the antrum, he showed a case a few years ago at a meeting of the Laryngological Society in which an ordinary mucous polypus had bored a hole through the root of the nose ½ in. in diameter, and as the nasal bone was thicker than that under discussion there could not be much difficulty in the latter being bored. In removing such polypi he had found adenoid forceps very useful. Sometimes, when a snare could not be applied, the polypus could be twisted off with such forceps. He had supposed that the reason why it had been asserted that polypi there came from the antrum was because there often was not room for them to have come from anywhere else.

Dr. JOBSON HORNE said that Dr. Grant spoke about a possible recurrence, and asked whether he entertained the view that the growth was more of the nature of fibro-angeioma than a simple nasal polypus.

Dr. SYME asked whether there was any sign of antral disease before the operation. There was now a shadow at the transilluminating test pointing to probable antral disease. If the growth came from the antrum and was forcibly pulled away one would expect that the antrum would be affected afterwards. He thought it was a confirmatory fact if it was free before and not now.

Dr. PEGLER said he thought the discussion required a little clarifying. He asked whether the general feeling was that most of such polypoid masses really emerged from the ostium of the antrum. Recently he had an interesting case under his care, in which he removed a digitate mass from the front that had depended into the naso-pharynx and blocked up both choanæ absolutely. The pedicle had sprung from the roof of the right nasal cavity, and as the case began to clear one or two small polypi emerged from the ostium of the antrum. It became necessary to do a radical antrum operation. He thought, from this and other experiences, that there were many exceptions, and that the roof of the nose or choana was a frequent starting point. The microscopic section in Dr. Grant's case showed fibromatous tissue.

Dr. GRANT, in reply, said the case presented itself as one of nasal obstruction, and he found the naso-pharynx entirely filled by a large, firm, pink swelling. There was no history of epistaxis, but in other respects it seemed exactly like naso-pharyngeal fibroma. While examining it under an anæsthetic he was able to pass his finger round it and to get his finger into the left choana, feeling what he felt sure was the edge of an opening leading into the antrum. He thought it hardly possible to say that the growths were in the middle meatus, because the posterior part of the inferior turbinal seemed to have yielded and been eaten away. He put in a strong ecraseur and grasped the tumour and tugged at it, and it came away with a tail attached. It was easy to pass the instrument into the naso-pharynx, and he could get it from the front. He scraped out the antrum as thoroughly as possible with a bent sharp spoon. There was dulness on transillumination, and he thought that if recurrence occurred it would be best to open the antrum through the canine fossa and carry out more thorough scraping. He used the ecraseur because he thought at first it might be a naso-pharyngeal fibroma which would require strangling. Microscopically, there was very little œdema in the tissue and it was slightly cystic, but the fibrous tissue in it was very dense. He did not doubt that the growth grew from the antrum. He passed the snare back to the point at which there seemed to be no more movement. There he grasped the tumour and did not believe that it slipped. Therefore the tail must have come from somewhere beyond the point at which the snare was applied. He thought it must come from the antrum. With the first finger of his left hand he could feel the anterior edge of it, and then his finger was introduced, coated with vaseline, through the anterior nares. He could not say the result of transillumination before the operation. There was now no pus running from it, and it looked as if the mucous membrane was thickened and that there was disease in the antrum. It confirmed what had been shown at the Section by Dr. Powell, Dr. Tilley, and himself, that the tumour which had recurred after removal without opening the antrum was only exterminated when the antrum was opened through the canine fossa, and the growth completely erased through that. Perhaps the word mucous polypus was not very strictly applicable in that case. If it was that originally, it had since become a fibrous tumour, *i.e.*, a fibroma without œdema. He thought Dr. Powell would agree that its density would explain that, after passing through the little opening and enlarging and causing atrophy by pressure in a bone already thin, there was formed a kind of fontanelle.

A Case of Lupus of the Epiglottis.

By W. Jobson Horne, M.D.

The patient, a girl aged 17, has experienced throat symptoms for twelve months; now only occasionally a sense of choking. The voice is less husky than when patient was first seen two months ago. The disease appears to be confined to the epiglottis and the left ary-epiglottic fold. There is no evidence of pulmonary disease, and the examination of the sputum is negative. There is no family history material to the case.

DISCUSSION.

Dr. McBride asked whether Dr. Horne had got microscopical evidence of the case being lupus. He asked because the nodules were larger than those usually seen in lupus. Secondly there was a ridge on the posterior wall of the pharynx, just above the larynx, which at rest was in contact with the tip of the epiglottis, and it was covered by mucus and looked like infiltration. He had worked a good deal at primary lupus of the mucous membranes and had seen many cases, but he had never seen lupus in the present position. He asked whether Dr. Horne had gone simply on clinical evidence.

The President said he saw with the mirror the ridge which was referred to, and on depressing the tongue he thought he saw lupus of the posterior wall of the pharynx.

Dr. Grant said that there was obviously disease of the right inferior turbinate body, and asked whether that presented the characters of lupus when examined under cocaine.

Dr. StClair Thomson asked whether Dr. Horne had excluded the nose, because Escat said that lupus was not found in the larynx unless it first appeared in the nose, and the right nasal chamber of the present case was so stenosed, and there was so much pus about, that one could not be certain whether lupus was present. A deposit of lupus was not uncommon in the post-nasal or pharyngeal space. If it were lupus it was a suitable case for galvano-cautery. But he once showed a case as bad as the present to indicate how diffident one should be in claiming any remedy as a curative agent. The case he referred to became absolutely healed up without any treatment.

Dr. Jobson Horne, in reply, said the diagnosis had been based upon the clinical appearance entirely; he had not been able to make a microscopical section, and he did not expect to have the opportunity, as he intended to adopt a conservative line of treatment by using the galvano-cautery. He had thoroughly examined the patient to ascertain whether there was evidence of lupus in any other part, but with a negative result. He had seen cases of lupus in the larynx without the disease being in the nose or naso-pharynx.

A Case of Laryngeal Paralysis.

By H. Clayton Fox, F.R.C.S.

The patient is a man aged 56, who has noticed some thickness of speech for the past two years. His right cord is practically fixed in the median position. There is some paresis of the facial muscles, but no further evidence of paralysis, and no evidence of intrathoracic or cervical disease. The case is shown with a view to eliciting a diagnosis.

DISCUSSION.

Dr. Vinrace thought the paralysis of the larynx and the general group of symptoms was due not to a local cause, but to an obscure nervous lesion of central origin, highly suggestive of bulbar paralysis. In support of that he pointed to the general aspect of the countenance; there was great sadness and a lack of expression. All he could see against that was that the whole of the face shared in the paresis.

Mr. Barwell said he thought it was scarcely possible to discuss the cause of the obscure lesions which produce fixation of the vocal cord without opportunities of more thorough examination than were afforded at the meeting.

Dr. FitzGerald Powell thought the man's speech pointed to bulbar paralysis. He asked whether members had seen many cases in which only one cord seemed to be affected in this disease.

Dr. GRANT regarded the case as one of disseminated sclerosis, but he thought it was a case of so much obscurity and interest that it should be referred to a neurologist for his analysis and opinion.

Mr. CLAYTON FOX, in reply, said he had omitted to state that the patient came, in the first instance, complaining solely of bilateral suppuration of the middle ear, for which he was being treated. The condition now being discussed was discovered accidentally. In regard to diagnosis, assuming it to be labio-glosso-laryngeal palsy, the paralysis of the larynx in this case was unilateral, which was not usual in this affection, also the paresis of the face was general. There were none of the usual symptoms of disseminated sclerosis present—rhythmical tremors, nystagmus, &c.—though it was possible that the facial nuclei and the nucleus ambiguus might be involved by sclerotic patches. He felt the difficulty of tracing the pathogenesis of such cases, where there was probably central trouble and nothing definite to be found in the neck or thorax. The paresis was highly suggestive of central trouble, and he agreed it should be referred to a neurologist.

A Case of Swelling of the Right Arytænoid, with Loss of Movement of the Right Vocal Cord.

By W. H. KELSON, M.D.

THE patient is a man aged 51, with a history of slight hoarseness and pain in the throat of three weeks duration, following rheumatism and bronchitis.

DISCUSSION.

Dr. STCLAIR THOMSON thought there was very little doubt that it was tubercular. There was pseudo-œdema of the right arytænoid and distinct ulceration at the upper part of the ventricular band on the same side. The man had lost flesh.

Mr. BARWELL agreed that it was a fairly typical case of tuberculous laryngitis.

Dr. FITZGERALD POWELL said that before giving an opinion it should be known whether the sputum had been examined and what had been found in the chest. The patient said he had been under treatment at some chest hospital. The clinical appearance pointed to tubercle.

Dr. KELSON, in reply, said that neither the lungs nor the sputum had, so far, been examined. He had only just seen the case for a few minutes, and he thought it was a proper case to show. He thought it looked more like tubercle than anything else, but the man had had syphilis and the condition looked rather red for tubercle.

A Case of Angeioma of the Right Tonsil.

By ANDREW WYLIE, M.D.

THE patient is a woman aged 26, who presents an enlargement of the right tonsil, the greater part of which is composed of a venous angeioma. The patient complained of no symptoms connected with the tonsil and, indeed, did not know that there was anything amiss in that region. She has been slightly deaf in the right ear for ten years. The opinion of the exhibitor is that no treatment should be attempted unless any symptoms of inconvenience arise.

DISCUSSION.

Dr. VINRACE said he concurred in the suggested treatment, or want of treatment, in the case; he thought it desirable to leave it alone. But general instructions should be given to the patient not to take anything likely to cut or damage it, as it might bring on hæmorrhage.

Mr. HUNTER TOD said, apropos of treatment, that at the first meeting he brought forward a case of venous angeioma of the palate, and it was then suggested by the Section that the external carotid should be tied. This had been done, but, although he made certain of having tied all the branches, it had no effect on the growth.

Dr. HORSFORD (on behalf of Dr. Wylie) said it was not his (Dr. Wylie's) intention to do anything to the growth, unless by its size or bleeding it caused trouble.

Case of Congenital Laryngeal Stridor.

By J. DUNDAS GRANT, M.D.

THE patient, a boy aged 3½, was referred to the exhibitor at Brompton Hospital on account of his noisy breathing: this was an inspiratory stridor which only ceased when the boy breathed with unusual tranquillity, and which was stated by his mother to have existed all his life. As he was obviously the subject of adenoids these were removed, but after this operation the stridor was rather more marked than before. Laryngoscopy was practically impossible on account of the restlessness of the child, but it was effected under chloroform while the epiglottis was held up by means of a hook. There was then observable a distinct insuction of the ary-epiglottic folds during inspiration. There is practically no change in the loudness of the stridor, which is very much the same as it had been during the whole of his life. There were, however, no indications for such an operation as tracheotomy. Although it was usual for the stridor in these cases to disappear before the child reached this age, it was still hoped that in time, as the larynx grew, it would disappear. There was no sign whatever of a new growth, and the nature of the condition was quite certain.

DISCUSSION.

The PRESIDENT said that the complaint had generally got well by that age.

Dr. GRANT replied that the patient was rather worse after the adenoids were removed. The stridor was continuous except when he was very quiet.

Case of Lupoid Ulcer of the Floor of the Vestibule of the Nose.

By J. DUNDAS GRANT, M.D.

THE patient was a man aged 36, suffering from advanced pulmonary and slight laryngeal tuberculosis. On the floor of the nose, extending to a small extent on to the septum, was an irregular somewhat papillated ulcer with very little loss of tissue and scarcely any discharge. It was of eight months duration, and, in view of the condition of the lungs and larynx, there seemed little doubt as to the nature of the disease. Its appearance was, in the exhibitor's experience, a most unusual one, and he admitted that he only made the diagnosis on the strength of the collateral disease.

DISCUSSION.

The PRESIDENT said he could not satisfy himself that there was ulceration.

Mr. BARWELL asked whether Dr. Grant had satisfied himself that the nasal lesion was tuberculous. The presence of pulmonary phthisis made one suspect tuberculosis, but the appearance was by no means distinctive of tuberculosis. Lesions occurring so late in phthisis should be more painful than this appeared to be.

Dr. GRANT replied that the ulceration was chiefly on the floor. He had not seen anything of the kind before. If it had not been of long duration, or if there had been no history, it might have been thought to be a specific lesion. It was eight months old, and he did not think anything would have lasted so long, except very weak tubercle.

A Case of Malignant Growth situated behind the Cricoid Cartilage.

By J. W. BOND, M.D.

THE patient, an elderly woman, has noticed difficulty in swallowing liquids for about four weeks. The growth is rapidly increasing, and was scarcely visible three weeks ago. There is, in addition, enlargement of the right lobe of the thyroid gland.

DISCUSSION.

Mr. BARWELL said that the growth was visible with the laryngoscope; but if it were lower down, or less advanced, it could probably only be seen by such a method as von Eicken introduced, namely, by pulling the larynx forward with a strong probe, guarded with wool or indiarubber, passed into the anterior commissure. Under cocaine anæsthesia the method caused remarkably little discomfort.

Dr. FITZGERALD POWELL said at first he doubted malignancy as the movement of the cords was fairly good, but Dr. Bond said he had passed his finger down and could feel the growth, so the diagnosis seemed fairly certain. He thought digital examination in growths in this position revealed much more than could possibly be made out by the use of the mirror.

A Case of Septal Deflection in a Phthisical Patient.

By A. HAMILTON BURT, M.R.C.S.

THE patient is a man aged 28. He has a troublesome cough and constant accumulation of mucus in the naso-pharynx and larynx: both vocal cords are injected. There is tuberculosis of both lungs and slight afternoon rise of temperature. The opinion of the Section was invited as to whether operation on the nasal septum was contraindicated by the general condition.

DISCUSSION.

The PRESIDENT said he thought the conditions present would contraindicate operation.

Mr. BARWELL agreed with the President. As both lungs were involved and there was an evening rise of temperature he considered any operation for nasal obstruction was contraindicated. If, later, the pulmonary disease became quiescent and he were without fever for, say, three months, and if the question arose of the patient resuming his occupation, he would then advise an operation, which could be performed without a general anæsthetic and without risk of blood passing down the trachea. There was marked simple laryngitis in this case.

Dr. JOBSON HORNE said he agreed with the President, but he could not agree with Mr. Barwell, because if the patient got through his phthisis without having his nose interfered with he advised that it should be left alone. He was convinced that nasal obstruction was a factor in the etiology of pulmonary tuberculosis and should receive more attention than it had done hitherto.

Dr. BURT, in reply, said he brought the case because the man's doctor said the cough was persistent, and on examining the naso-pharynx he saw a quantity of discharge running down the posterior wall. He thought the nasal trouble was more the cause of the persistent cough than was the lung trouble, because he had put on 30 lb. since December. Last time the patient was examined there were only fine crepitations in both apices, and that was after a severe attack of pneumonia. So there seemed much hope if the larynx could be rested and the discharge stopped.

A Case of Subcutaneous Induration of the Neck of Uncertain Causation.

By E. WARD, M.D.

(Introduced by Mr. HUNTER TOD.)

THE patient, a woman aged 32, first noticed, while washing three or four weeks ago, swelling and a "hardness" in the neck. This swelling began over the region of the thyroid cartilage and extended laterally and downwards towards the chest. She has had an eruption of acne rosacea on the face for two years, and has been treated for five weeks by Dr. Sequeira. The larynx, lungs and heart are normal, and there is no evidence of intrathoracic growth.

DISCUSSION.

Dr. GRANT thought it looked like gumma, but he could not elicit anything in the history to support that, with the exception of a miscarriage.

Mr. CLAYTON FOX thought there was pus beneath the deep fascia—it seemed to be cellulitis.

Dr. VINRACE supported Mr. Fox's view, and thought a free central incision should be made into it and drainage carried out. He did not think it was syphilitic.

Dr. PEGLER thought iodide of potassium might make some clearance.

Dr. SYME said there was a general tendency to oedema of the face and ears. The condition outside the throat looked like what one saw in the face from lymphatic engorgement with nasal obstruction.

Mr. TOD said he saw the patient for the first time ten days ago. At first he thought it might be syphilitic perichondritis, but there was nothing to see in the throat. Large doses of potassium iodide had been administered, but had had no effect. Since then the swelling had spread more to the left side and down to the supraclavicular region, and the patient stated that she had difficulty in moving the arms and shoulders. Against the diagnosis of abscess was the fact that there was no pain, pyrexia, or redness of the skin.

Dr. FITZGERALD POWELL thought it was a case of cellulitis, and that it should be freely incised and fomentations applied.

Dr. WARD, in reply, said he could not find anything in the thorax. He had seen three similar cases. One was under the care of Mr. J. Hutchinson, jun., and developed a red indurated swelling of the neck which was thought to be cellulitis. It was fomented without effect, and at consultation was thought to be new growth. It spread to the larynx, and tracheotomy was necessary. The pathologist pronounced the section to be lympho-sarcoma. Another case was under Mr. Eve; this also was at first considered to be inflammatory, but after free incisions the swelling spread more rapidly than before. The man died, and at the autopsy a new growth was found infiltrating the tissues, said to be endothelioma. In another case iodides failed to relieve it, and it disappeared under X-rays. He suggested that the present case was one of malignant growth. It might react to X-ray treatment.

Case of Killian's Operation for Chronic Suppuration in the Frontal Sinus.

By J. DUNDAS GRANT, M.D.

THE patient was a man aged 33, who for several years had suffered from a purulent discharge from the left nasal cavity. He had had an external operation on his left frontal sinus six weeks before coming under the observation of the exhibitor. There was then a scar rather below the left eyebrow, and a small sinus from which a drop of pus exuded. The antrum was found to be opaque on transillumination and was therefore punctured and washed out by means of Lichtwitz's trocar, an enormous quantity of very fœtid pus being evacuated. The fluid which was syringed into the antrum found its way up to the frontal sinus, and came out of the external vestibule; the reason for this was probably that the middle turbinated body directed it upwards, and it was therefore decided to remove the middle turbinal and to reopen the frontal sinus. The patient was subjected to a very complete Killian operation, the bridge above the orbit being retained, although it was somewhat difficult to do this on account of the amount of bone which had been removed at the previous operation; the sinus extended to the outermost angle of the orbit, and the whole of its anterior wall was therefore removed. The trochlea was detached along with the periosteum of the roof of the orbit, and turned downwards and outwards along with the eyeball. The steps of the operation were exactly those formulated by Killian, including a very free removal of the floor of the sinus nearly to the back of the orbit. This operation was carried out a fortnight previous to his being shown, and already the purulent discharge had disappeared, as also the diplopia, which had lasted for about a week after the operation. The amount of depression was extremely slight, though the exhibitor anticipated that it would increase to some extent as cicatricial contraction advanced in the interior.

Laryngological Section.

June 12, 1908.

Dr. J. Barry Ball, President of the Section, in the Chair.

Report of the Morbid Growths Committee.

Mr. C. A. Parker's specimen of infiltration of the nasal cavities (shown at the meeting of April 3, 1908[1]): "The specimen from the middle turbinal is composed of a mass of chronic inflammatory tissue; a giant-cell was observed, but no tubercle systems could be found. In a specimen from the inferior turbinal, furnished at the request of the Committee, vessels are seen showing marked endarteritis."

A Case of Malignant Growth of the Septum and Naso-pharynx removed by an External Osteoplastic Operation.

By P. Watson Williams, M.D.

E. C., female, aged 25, single. On December 9, 1907, she was admitted to the Bristol Royal Infirmary for nasal obstruction and severe and repeated epistaxis, after the attempted removal of a supposed nasal polypus. By anterior rhinoscopy a neoplasm about the size of a forefinger-tip was seen to be growing from the septum, about 1 in. behind the vestibule, and blocking the nasal passage completely. By palpation and by posterior rhinoscopic examination the growth was seen to extend backwards, growing from the posterior choana and roof of the naso-pharynx. A removed fragment was submitted to Professor Walker Hall, who pronounced it to be a round-celled sarcoma. It was evident that nothing short of the complete extirpation of this extensive malignant growth could be successful, and, as the growth was exceedingly vascular, it seemed best to adopt a method by which the blood could be excluded from the pharynx.

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[1] *Proc. Roy. Soc. Med.*, 1908, i., No. 7 (Laryng. Sect.), p. 91.

December 12, 1907: Operation was performed by an osteoplastic flap, similar to that made by the exhibitor for the fronto-ethmoidal radical operation (fig. 1), though not reaching so high up. The first incision extended down to the bone, from the root of the nose just to the left of the middle line, as far as the free lower border of the nasal bone, the incision being continued into the nasal passage. A second incision curved down from a point internal to and above the inner canthus down to the middle of the lower orbital margin, the lachrymal duct turned outwards, and the groove opened into the nose. A transverse incision united the upper ends of the other incisions, the nasal bone was divided from the frontal bone by a chisel, and a fine narrow saw, passed into the left nasal passage so as to emerge at the opening made in the lachrymal groove, divided the nasal process of the superior maxillary bone from within outwards without injuring the overlying soft tissues. The flap thus formed was turned down and held aside,

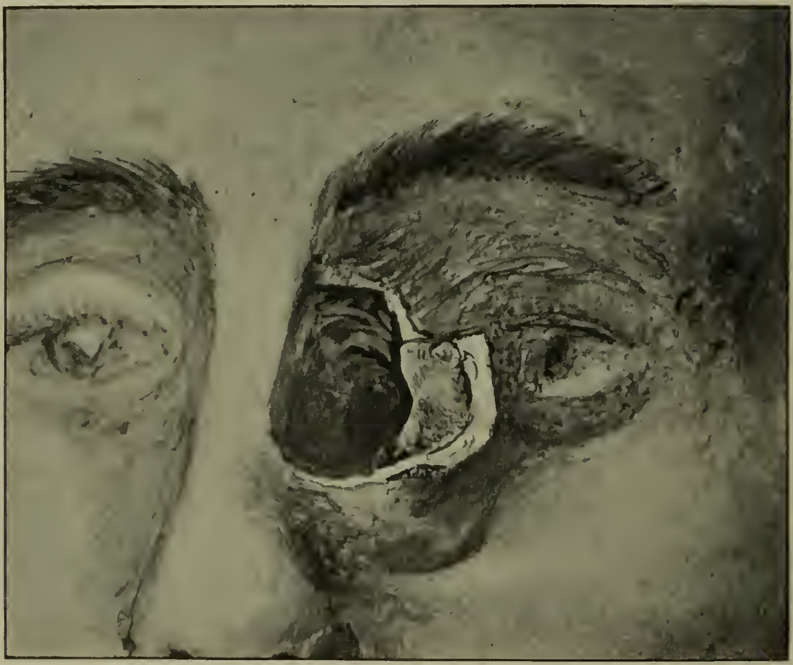

FIG. 1.

Photograph of a model, showing the operation performed as described in the text.

the naso-pharynx being plugged by a naso-pharyngeal forceps-sponge-holder. The septum was rapidly removed from a little in front of the growths right back to the naso-pharynx, the whole septum being removed except the anterior margin of the cartilage. The left ethmoidal cells and middle turbinal were likewise cleared away back to the sphenoidal sinus, and the growth was also cleared away from the roof of the naso-pharynx. The osteoplastic flap was finally pushed back into position and sutured.

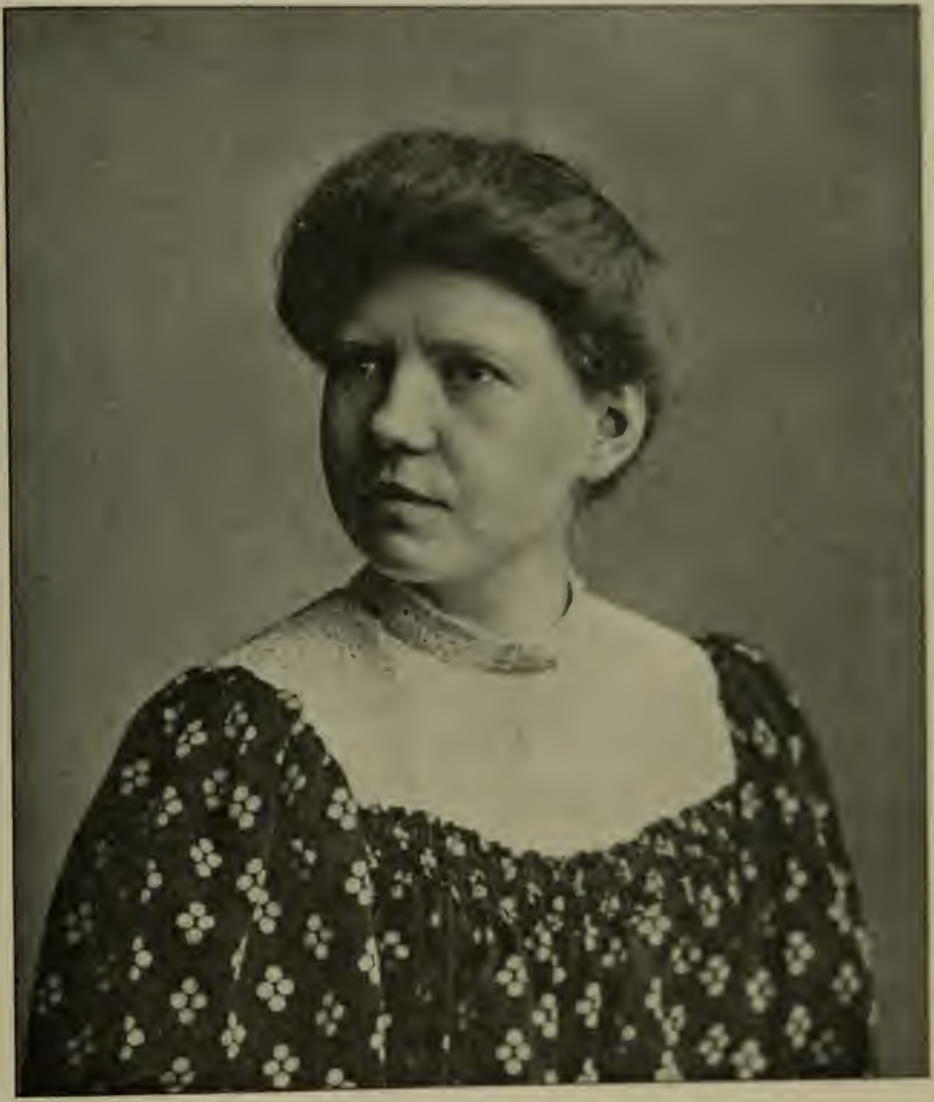

FIG. 2

Patient after operation (on the patient's left side) illustrated in fig. 1. Reproduced from an untouched negative showing absence of any scarring or other defect.

Recovery was uninterrupted, without any facial defect or deformity whatever (fig. 2). The growth has not so far recurred.

DISCUSSION.

Mr. DE SANTI said Dr. Williams might be congratulated on the excellent result in the case. The way in which he had been able to lay open the part affected from the front of the nose into the naso-pharynx was excellent, and he wished to know whether there was any difficulty on account of hæmorrhage. As a rule in dealing with anything at the back of the pharynx the best procedure was to split the hard and soft palate; but in this case the growth was mainly on the septum, but also came partly from the pharynx. The cosmetic effect was very good, and there appeared to be no sign of recurrence.

Dr. P. MCBRIDE said the way of approach was not novel, although the method of carrying it out was. Moure, some years ago, suggested gaining access to the nose through the nasal bone and through the ascending process of the superior maxilla. Dr. Williams was to be congratulated on having produced the same result with little deformity.

Mr. STUART-LOW said he also wished to congratulate Dr. Williams on his success. In a similar case in which he assisted Mr. Nourse the soft parts were reflected by making the usual incision for excision of the upper jaw. This gave very good access to the malignant tumour in the antrum and nose when the anterior wall and ascending process of the superior maxilla were taken away. No deforming scar was visible, and the operation was most successful.

Mr. CHICHELE NOURSE said he had been much interested in the result, and had noticed the very slight scar. The case was also of interest to him because of the good exposure which the operation gave. In his own case (alluded to by Mr. Stuart-Low) Mr. Nourse removed the ascending process of the superior maxilla and part of the nasal bone, also the inner wall of the antrum. This gave a good exposure, and it would have been easy to remove a growth in any part of the nasal cavity or in the naso-pharynx. The growth was springing from the ethmoidal region. The scar was slight.

Mr. WAGGETT said Rouge's operation should not be forgotten. He had shown a case of extensive growth, and he remembered with pleasure the great ease with which the whole growth was removed, firstly without hæmorrhage, and secondly without leaving a scar. It gave an entire view of the whole interior of the nose, and scarcely needed a stitch after the completion of the operation.

Dr. WATSON WILLIAMS, in reply, said the hæmorrhage was entirely controlled by his post-nasal plug, which he used for all such cases and which could be pulled down slightly in the naso-pharynx in the course of the operation, without disturbing its function of stopping the blood from getting into the pharynx. Into that part no blood whatever entered during the whole operation. Although in a case of a naso-pharyngeal growth one would naturally split the palate, he was so pleased with the perfect access which he obtained to the naso-pharyngeal region in this case, and the complete control of hæmorrhage by this method of plugging, that he felt strongly in favour of this way of approach in cases where grave hæmorrhage was to be feared. With regard to Rouge's operation, his strongest reason for not approaching the growth from below was that the growth was attached high up on the septum and in the ethmoidal region, and therefore he preferred to get access from above. That region was the most dangerous and difficult to gain access to. He showed the saws which he used for dividing the nasal process of the maxillary bone; it could thus be turned back in the flap and saved, whereas Moure, he understood, simply excised the nasal bone and the nasal process.

A Case of Laryngeal Disease.[1]

By P. Watson Williams, M.D.

H., GARDENER, aged 24, has suffered from hoarseness for three and a half years. In December the left vocal cord was immovable and was covered almost entirely by a swollen ventricular band, along the free margin of which was a fairly circumscribed fringe with a shallow ulcer on the free edge. There was some fulness of the region outside the right ary-epiglottic fold, corresponding to the outer surface of the cricoid cartilage. The movements of the right cord were unimpaired. Since December the laryngeal disease has steadily progressed, the right side being now nearly as much implicated as the left.

February 26, 1908: Patient had been suffering from dyspnœa due to the increasing laryngeal obstruction for some days, and tracheotomy was performed under local anæsthesia. The right ventricular band and swelling over the cricoid cartilage had much increased, and the left ventricular band was also swollen along its inner border. The arytænoid regions were somewhat swollen and œdematous. Calmette reaction negative. Temperature normal or subnormal. Pulse varying between 80 and 90 a minute before operation.

May 11, 1908: For some time the laryngeal obstruction has been complete. Both ventricular bands and arytænoid regions much swollen, concealing the vocal cords completely. A piece about the size of a lemon-pip was removed from the left ventricular band near its margin, and submitted to Professor Walker Hall, who reported that "it showed no evidence of recent tuberculous or syphilitic disease. It is chiefly papillomatous in nature with some fibrosis of the subdermal tissue." Meanwhile two large hard movable glands have appeared in the neck on the left side—one just outside the top of the great cornu of the hyoid bone, and another a little lower on the level of the thyroid ala. The lungs are clear except that there was some increased vocal resonance and bronchial breathing in the left suprascapular region.

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[1] Shown at the meeting on December 6, 1907. *Proc. Roy. Soc. Med.*, 1908, i., No. 3 (Laryng. Sect.), p. 23.

He is steadily losing weight. The secretions from the larynx and expectoration never revealed the presence of tubercle bacilli, but numerous capsulated diplococci were found. Four times Calmette reactions have been negative. He was put on large doses of iodide of potassium before he was first shown, but with no benefit. The temperature now is usually normal, but sometimes reaches 100·2° F. at night.

DISCUSSION.

Sir FELIX SEMON said that in a case of the kind where the patient was so young one hesitated to speak of malignancy, but he thought some of that apprehension had been removed by the recent demonstration of Professor Chiari at the Congress of Vienna. The patient was a girl aged 16, who had absolutely certain epithelioma of the larynx. Not only was the patient shown with the characteristic growth, but microscopical slides, which had been made from various preparations, placed the matter beyond doubt. Had the present patient been aged 50 he believed everyone would say it was an infiltrating malignant growth, leading to very considerable enlargement of the cervical lymphatic glands, and that, he believed, would be the correct diagnosis. The only alternative, he thought, was perichondritis from some unknown cause, but he did not see how that could be reconciled with such enormous swelling of glands. He thought it was malignant, notwithstanding the apparently negative result of the microscopical examination. In his view the microscopical appearances were not decisive.

Dr. JOBSON HORNE considered that a definite opinion might be based upon the microscopical specimen submitted, and suggested the reference of the specimens to the Morbid Growths Committee.

Dr. PEGLER seconded the proposition, and, Dr. Williams consenting, it was agreed to, on the understanding that the specimens should be returned to him, as they belonged to the Bristol Royal Infirmary.

Mr. DE SANTI said that the suspicion of malignancy, despite the age of the patient, was so great that one would be justified in doing an exploratory operation, having put the gravity of the case before the patient, and being prepared to do a complete extirpation if necessary.

Dr. WATSON WILLIAMS, in reply, said he had not made a diagnosis—he had hovered between tuberculosis and malignancy. He had given the reasons for feeling it was not tuberculous. The patient had suffered from hoarseness three and a half years before he showed him first, which was against its being malignant, though that did not necessarily mean it was due to the disease from which he was now suffering. If it were malignant, owing to the extent of the disease he would be chary of operating, for nothing short of total extirpation of the larynx would do any good. If he were to do an exploratory operation, it would be only after obtaining the patient's sanction to do complete extirpation if necessary.

A Series of Skiagrams showing the Accessory Sinuses of the Nose.

By P. Watson Williams, M.D.

These skiagrams illustrated normal sinuses, and in some cases the existence of suppuration in one or both frontal sinuses or in the ethmoidal cells. In some examples probes were shown in situ in the frontal sinus or sphenoidal sinus.

A Photograph showing Remarkable Development of the Orbito-ethmoidal Cells.

By P. Watson Williams, M.D.

The ethmoidal cells on the right side entirely replace the frontal sinus, and on the left side a large ethmoidal cell lies just outside the frontal sinus.

DISCUSSION.

Dr. Jobson Horne, referring to the photograph of Dr. Watson Williams's specimen of imperfect development of the frontal sinus, said it illustrated a developmental point of surgical importance, namely, that the frontal sinus was essentially a glorified ethmoidal cell.

Dr. Watson Williams said he agreed with Dr. Horne that the frontal sinus was developmentally a large ethmoidal cell, but the ethmoidal cells shown in the specimen did not open by a fronto-nasal duct, whilst the fronto-ethmoidal cells did.

Dr. Jobson Horne, in reply to Dr. Williams, said the fronto-nasal duct was developed out of three ethmoidal cells.

Dr. Paterson said he would like to put in a plea for calling the fronto-ethmoidal cells frontal cells. They might be regarded, so to speak, as the satellites of the frontal sinus, being all developed from the frontal sulci in the frontal recess. They were very intimately connected from a practical point of view, as they were in most cases affected in common by suppurative disease.

Dr. WATSON WILLIAMS, in reply, said without entering into a long discussion, he ventured to disagree with Dr. Horne. One could hardly see all the points of importance from the stereogram shown, but these large ethmoidal cells probably corresponded with what were called the middle ethmoidal cells, which had extended forward, and were not the fronto-ethmoidal cells to which Dr. Jobson Horne and Dr. Paterson evidently alluded.

A Specimen of a large Post-nasal Polypus removed from a Boy aged 14½.

By HERBERT TILLEY, F.R.C.S.

A BOY, aged 14½, had suffered for two years from nasal obstruction. In the summer of 1907 his general medical attendant snared away some polypi, but they quickly returned and were again removed and their bases freely cauterized. Recurrence again took place, and in addition a large post-nasal growth became visible.

Patient was seen by exhibitor on March 29, 1908. There was complete bilateral nasal obstruction with very "deadened" voice. A polypus occluded the entrance to the left nasal cavity, and the rounded end of a large swelling could be seen just below the free edge of the palate, the latter being bulged downwards and forwards. The growth was semi-translucent, firm to the touch, and was proved by digital examination to spring from a pedicle situated in the posterior ethmoidal region. Transillumination showed both antra to be clear, and no pus was present in either nasal cavity. Under chloroform narcosis the large polypus was removed *in toto* with forceps, and no severe bleeding resulted. The smaller intranasal polypi were removed with an ordinary snare, and the ethmoidal region was thoroughly curetted. The left maxillary antrum was not explored.

DISCUSSION.

Dr. WILLIAM HILL asked whether it was a polypus arising in the post-nasal space or whether it was a nasal polypus which had grown into the post-nasal space.

The PRESIDENT (Dr. J. Barry Ball) said it was a nasal polypus growing backwards into the post-nasal space.

Mr. CRESSWELL BABER said he did not think there was anything unusual about the case except the early age of the patient. He had often removed such polypi with a snare from the front of the nose, with a finger in the nasopharynx, and usually without the aid of an anæsthetic.

Dr. WATSON WILLIAMS said he was glad to see that forceps were used in the case and not the snare. He now but rarely used the snare, which was often wasting time in cases when it became necessary, after all, to attack the base from which the polypus was growing. The forceps were therefore better used at first.

The PRESIDENT said he agreed with the remarks of Dr. Watson Williams. Sometimes the forceps were very useful for removing polypi which were far back. He presumed that in the present case a general anæsthetic was given, not to remove the polypus but to clear out the ethmoid.

Mr. HERBERT TILLEY, in reply, said he gave a general anæsthetic because the patient was an under-sized boy of 14½ and very nervous, and in addition he had smaller polypi which could be seen from the anterior nares. It would have been quite impossible to pass a snare through the nostril and over the large posterior growth. Under the anæsthetic he removed the anterior polypi with the ordinary small snare and took hold of the large posterior polypus with ordinary "adenoid forceps." Practically no force was required to bring it away. He showed it because it was a very large polypus extending below the uvula, producing much trouble in an anæmic little boy. He also curetted the ethmoidal region. He made a note that "the left maxillary antrum was not explored," and this because it transilluminated clearly, and secondly because he (Mr. Tilley) had already opened three antra in similar cases and had not found the base of origin within this sinus, and hence thought it was scarcely worth while making a similar exploration in the present instance.

A Stereoscopic Slide showing well-marked Development of the Orbito-Ethmoidal Cells.

By HERBERT TILLEY, F.R.C.S.

THE cells are seen from within the nasal cavity. The slide also shows a well-developed moriform hypertrophy of the posterior end of the inferior turbinal.

A Specimen of Subglottic Hyperplasia with considerable Narrowing of Tracheal Airway.

By HERBERT TILLEY, F.R.C.S.

THE patient, aged 34, observed some difficulty in breathing three years ago, but only on exertion or fast walking. Shortly afterwards he suffered from several attacks of malaria in the north-west of

Ceylon. He recovered from these, but the breathing difficulty increased, and he began to experience a "feeling of irritation in the windpipe," from which he coughed a considerable amount of mucus. For twelve or thirteen years he bled rather frequently from the nose, and often had to remove blood-crusts therefrom. No history of syphilis was obtainable, and, as iodide of potash in 10 gr. doses produced marked iodism, hydriodic acid was tried. He had small-pox when aged 5 or 6, and had been until recently a heavy smoker for seven or eight years.

Examination of larynx: The vocal cords had normal appearances and movements. Below the glottis the airway was much narrowed by a concentric hyperplasia of rather bright red colour. The right side of the nasal septum was superficially excoriated, and in this nostril there was a considerable accumulation of crusts formed of muco-pus with an admixture of blood. The combined nasal and tracheal appearances were suggestive of syphilis, in spite of the absence of any history of this disease. The patient recently died with symptoms of general septic intoxication. Tracheotomy was performed during the last illness.

DISCUSSION.

Mr. TILLEY explained that he was only able to show the patient's larynx because, three days after he sent in the notes of the case, the patient was admitted to the hospital complaining of feeling very ill. His temperature was 103° F., and he had a painful, inflamed and œdematous swelling on the inner side of the left arm, opposite the elbow, obviously phlebitis. He remained in the hospital until three days ago, when he died. The symptoms were those of general septic intoxication. The breathing became so difficult that the patient asked that a tube might be inserted. That was done, and the breathing was relieved, but not the general condition. A pure streptococcal culture was obtained from the arm, but he did not know what the subglottic stenosis was caused by, though it had been present during the last few years of his life without interfering with speech. On looking to see what caused the stridor he saw the subglottic web, which had reduced the airway so that it would only admit an ordinary slate-pencil. The web was very red. On the right side of the nasal septum there was a superficial ulceration, from which blood-stained crusts of muco-pus were frequently blown. Therefore he concluded the case was specific. But there was no history of syphilis obtainable, and iodide of potassium did not agree with nor improve the patient's condition. Hydriodic acid was tried, but was discontinued when septic symptoms arose. He asked whether any member could throw light on the pathology of the laryngeal condition.

Sir FELIX SEMON asked what was the nationality of the patient. (Mr. Tilley: "Cingalee.") He would have the specimen examined for scleroma. There seemed an absence of any other etiology.

A Case of Abscess in the Left Cerebral Frontal Lobe, originating from Suppuration in the Left Frontal Sinus.

By L. V. CARGILL, F.R.C.S.; WILLIAM TURNER, M.S.; and STCLAIR THOMSON, M.D.

G. O., AGED 31, was admitted to the Seamen's Hospital twenty-one days after influenza with a temperature of 100° F. and left orbital cellulitis. This was incised and pus was evacuated. Fourteen days later patient became depressed, then noisy and irritable. Optic neuritis was well marked. Mr. W. Turner opened the frontal sinus and found the posterior wall softened and easily broken down. This exposed the cerebral surface, together with dirty, grey-looking granulations. The brain itself was exposed by removal of this piece of bone, but no dura mater could be discovered. The brain pulsated and did not bulge. A needle was inserted directly backwards and thick creamy pus was struck; 3 oz. to 4 oz. of pus poured out, yielding a pure culture of *Staphylococcus aureus*. The papillitis subsided. Some diplopia was left from paresis of the left superior rectus. The patient is now quite well. No pus can be discovered in the nose, and no history of nasal suppuration at any time could be obtained.

The case is evidently one of acute closed suppurative frontal sinusitis, with secondary abscess in the left frontal cerebral lobe.

DISCUSSION.

Dr. SCANES SPICER said it seemed very difficult to examine the ethmoidal region on that side, owing to the bend on the septum. Mr. Turner was to be congratulated on having gone for cerebral abscess, because there seemed to be nothing to lead to that diagnosis, but the result was triumphant. It would be interesting to know how infection arose there—was it a general blood infection, or through the ethmoidal, or through the frontal? He had shown a very extreme case of frontal bone infection two or three years ago (and again a year afterwards) with abscess in the frontal sinus, but no discharge into the nose. It came on after influenza, and it was necessary to go through $\frac{3}{4}$ in. of red, spongy bone before getting down to a very small frontal sinus. He had always been puzzled as to how infection of the sinus occurred in such a case. He inquired if the nature of the organism—*Staphylococcus aureus*—suggested any hint as to infection having originated from the nose or from the general blood-stream.

Mr. STUART-LOW congratulated Mr. Turner on the case. Dr. StClair Thomson, in one of his lectures, laid it down that in suppuration of the labyrinth of the nose the most likely event was septic meningitis, whereas in suppuration of the labyrinth of the ear, in contrast, the most likely thing to happen was septic abscess. But such did not seem to have been so in the present case. Those who had seen the case did not seem to recognize the fact that the nose ought to be operated upon, otherwise the condition would recur, from damming up of pus in those upper regions again. The original cause must have been an obstructed condition of the nose. He had illustrated this case by means of the spirograph. This instrument had been inveighed against recently by some who ought to know better, but Dr. Wyatt Wingrave's modification of the original spirograph was most useful in diagnosis.

Dr. STCLAIR THOMSON, in reply, said Mr. Stuart-Low's rendering of his lecture was not quite correct. He did not absolutely lay down anything, but he drew some conclusions from his observations as regards cerebral infections from the accessory sinuses of the nose. The conclusions he drew were that from the sphenoidal sinus there might occur thrombosis of the cavernous sinus, or basal meningitis; from the frontal sinus, abscess in the fronto-cerebral lobe; and from the ethmoid, meningitis. It was lucky that the present patient had what ophthalmologists called orbital cellulitis. Had he been brought into hospital after influenza and been troublesome, and then stupid, he would have died, the abscess would have been found, and it would have been called idiopathic primary cerebral abscess! Unfortunately the nose had not yet received the consideration it deserved, either from general physicians or pathologists in the post-mortem room. He asked what made Mr. Turner go for the brain. Were there any localizing symptoms? The case reminded him of those which Dr. Milligan and he himself had reported. In his own case a patient, while under treatment for her frontal sinus condition, had pain on the opposite side. She was looked upon as an hysterical person, her temperature went up, and he thought it was an infection from her sphenoid, which he opened. She died, and an abscess was found in the left cerebral lobe, which had probably been latent some time and then awakened into activity.

Mr. HERBERT TILLEY desired to refer to a case which gave point to Dr. StClair Thomson's remarks. Eighteen months ago he saw a man whom it was difficult to examine owing to the poverty of the surroundings as well as the apathetic condition of the patient. Six weeks previously his ethmoid region had been operated upon by a local doctor, and this fact made it difficult to know how much of what was seen in the ethmoidal region was the result of the operation and how much was disease. The patient had been lying in an apathetic condition for a week. Reasonable answers were given to questions, but he seemed to be in a rather depressed condition, which, however, was said to be his normal attitude. There was no pain, swelling, or discomfort about the frontal region. Three days later he died. The sinus was opened, and a small quantity of pus issued through its posterior wall and a large frontal abscess was found. That possibility should always be remembered in cases of discharge from the nose occurring in patients exhibiting mental symptoms of the type which had been described.

Mr. WILLIAM TURNER, in reply, thanked the Section for allowing him to show the case, and said the discussion on it had been most interesting from many points of view to the general surgeon. It showed the difficulty there was in classifying some of the cases of orbital cellulitis and idiopathic infective periostitis. This case started, no doubt, with frontal sinus trouble. The reason he searched for a cerebral abscess was very difficult to state, but the condition of affairs was that the man had obviously got worse; he was very quiet and depressed, and only just answered questions and did as he was told. The temperature and pulse-rate were subnormal and he had double optic neuritis, as he saw for himself, and it was confirmed by the oculist. There was also marked proptosis of both eyes; on the left side it had been present since admission, and the veins of the forehead were enlarged. Those last two features made the diagnosis somewhat difficult, as he had seen them in thrombosis of the cavernous sinus. The patient had neither vomiting nor headache. The man was so critically ill that there was no time to have a blood-count made. The sinus was discharging pus, and the bone at the bottom was clearly carious. He said the man ought to be given the benefit of the doubt. He (Mr. Turner) had seen other cases of cerebral abscess with anomalous physical signs, and in one case, although he operated, he did not discover the abscess; it was in front of the frontal lobe, and the patient died. In the present case, therefore, he operated, and found what had been described. If it were thrombosis of the cavernous he felt he could not do the patient any harm, whereas if it should be abscess operation would give him the chance of life, and a very good life too.

Four Cases illustrating the Surgery of the Sphenoidal Sinus.

By StClair Thomson, M.D.

Case I.

Sphenoidal Sinus Operation on Both Sides.—J. U. Y., aged 32. The anterior wall of the right sphenoidal sinus has been entirely removed, leaving an opening large enough to admit the tip of the forefinger. The cavity is quite clear, and free from any traces of suppuration, and lined with a pink mucosa. The orifice of the left sphenoidal sinus has been entered, and although not so open as it was at first is still quite patent. The cavity is very large and is quite free from suppuration. This patient had a pansinusitis. In order to obtain access to, and drainage of, the fronto-ethmoidal regions a submucous resection was performed on the septum. Every sinus has been operated on except the right maxillary. This latter was found to contain pus on several occasions, but it has ceased to suppurate since the frontal, ethmoidal, and sphenoidal have been cured. Pus persisted in the left maxillary sinus, and this has recently had a Caldwell-Luc performed on it.

CASE II.

Sphenoidal Sinus Operation on the Left Side.—Mrs. B., aged 21. A large opening had been made into the left sphenoidal sinus, which is now perfectly healthy and free from suppuration. The ethmoid has been well cleared away and a Caldwell-Luc has been performed on the left maxillary sinus. Although the antro-nasal opening is very large, the cavity still secretes.

CASE III.

Sphenoidal Sinus Operation on the Right Side.—Mrs. W., aged 46. Pansinusitis of the right side. This patient suffered so intensely from headache that she was first admitted to the Queen Square Hospital for suspected cerebral tumour. The right frontal sinus was repeatedly washed out; her headaches were relieved, but at times recurred with intensity. These recurrences were found to be associated with exacerbation in the frontal and sphenoidal sinuses. The Killian operation on the right frontal sinus is not as æsthetic in result as usual, as part of the bridge necrosed. However, the cure of the fronto-ethmoidal suppuration is complete. The anterior wall of the sphenoidal sinus has been removed, and the cavity is quite free from suppuration, even during bad "colds." (Some remains of ethmoid have lately been curetted, and this has given rise to a small adhesion which now obscures a complete view of the sphenoidal opening.)

CASE IV.

S. E., aged 25. The right sphenoidal sinus has been freely opened, showing a pale pink and quite healthy mucosa. It has been free from suppuration for many months. The left sphenoidal sinus has been enlarged, is quite patent, and all suppuration has ceased. This patient had a pansinusitis. All the cavities, except the right maxillary sinus, have been opened. On the left side the operations on the antrum, ethmoidal, and sphenoidal sinus have been completely successful. It will be seen that the Killian operation has also succeeded in obliterating the frontal cavity, yet the patient is not free from suppuration. This appears to come from the "dead space" lying between the bridge and the posterior frontal wall. This case illustrates the weak point of the Killian operation, and there does not appear to be any means of correcting it.

DISCUSSION.

The PRESIDENT said the cases in the series could be used to illustrate the surgery of all the sinuses; they were all suffering from pansinusitis. He hoped that any remarks would be confined to the sphenoidal sinus, as the discussion of all the sinuses would be too great a tax on the time. These cases showed the now fairly familiar fact that the sphenoidal sinus, so far from being the least accessible sinus, as was thought formerly, was the most easily exposed, inspected, and treated.

Dr. PATERSON said, in connection with the phrase "dead space" in Case IV., he would like to join issue with Dr. Thomson in his explanation of the failure of the Killian operation. He had examined that small space in several cases by means of a small mirror, and had found it well lined with epithelium, and clean. He did not think that the space *per se* gave rise to discharge, and he believed there must be some other explanation for the pus persisting. In certain cases, where there was a very large opening of the frontal sinus and practically no infundibulum, there was a dead space, in the sense in which Dr. Thomson used the term, but no pus, unless, of course, it was definitely infected with disease.

Dr. WATSON WILLIAMS was inclined to agree with Dr. Paterson that there was another cause. The series was a magnificent one, and taught many things about the sphenoidal sinus; such a collection was difficult to criticize, but he thought the one case illustrated the weak point in the Killian operation. For that reason he (Dr. Watson Williams) had been resorting to the osteoplastic method, by which the whole region was thrown open before the operator, and no bridge was made, so that there could be no doubtful recesses left behind.

Dr. STCLAIR THOMSON, in reply, said that to discuss the "dead space" would take a long time. It had been recognized by other people, and was not his discovery; in fact, the term originated with the French. It was difficult to fill it up. There must be a big space between the back of the bridge and the posterior wall, and Dr. Paterson said it was lined with epithelium. It was; but one wanted the frontal sinus to be filled with scar tissue. Those cases had not any epithelium, but cicatricial or scar tissue. He regretted the patient referred to did not come, but he would send him to any member's clinique, when he thought it would be conceded that the frontal sinus had been obliterated. Although he had an excellent Killian bridge the sinus was so deep that there was some disfigurement from the great depth to which the anterior wall had fallen in. The nose was now quite free from pus, the ethmoid, the maxillary antrum, and the sphenoid were cured, yet some pus could always be got from the "dead space." It might be suggested that a fronto-orbital or fronto-ethmoidal cell had escaped detection, but he could not find that it was so. He still thought that that dead space was the weak point in the Killian operation.

A Case of Marked Deviation of the Septum in a Man.

By StClair Thomson, M.D.

This shows a form of deviation for which no relief could be obtained except by submucous resection. Adhesions show previous ineffectual efforts to free the left nostril.

A Case after Operation for Angina Ludovici.

By W. Stuart-Low, F.R.C.S.

The patient was a female of middle age. The abscess had been accumulating for a week, and was very deeply situated. It was opened under an anæsthetic through a deep incision in the middle line of the neck, and on the second day a salivary calculus (also exhibited) was found in the wound.

DISCUSSION.

Dr. P. McBride asked whether the inflammation caused by a salivary calculus could properly be called angina Ludovici. It used to be considered as a special form of inflammation, but perhaps things had now changed.

Mr. Clayton Fox asked whether the calculus was observed in the duct through the mouth previous to the abscess which led to the cellulitis in the neck.

The President said that it would be generally agreed that the description angina Ludovici was a misnomer.

Mr. Stuart-Low, in reply, said he thought the term he had used was very expressive of the location of the abscess, and for that reason he preferred to adhere to it. At the time he saw the case he could not say the condition was caused by the calculus, but it turned out to be the real cause. He would apply the name to an abscess in that situation, however caused. The case was sent into the hospital in great urgency with dyspnœa. When the woman came in she had a large swelling under the lower jaw, and the tongue was up against the roof of the mouth. He could not feel the floor of the mouth, as he could not introduce the finger. The woman said that for months before she had had a swelling under the jaw after eating, which would point to the probable presence of a salivary calculus.

A Case of Malignant Disease of the Larynx.

By Dan McKenzie, M.D.

THE patient, a male aged 51, has been suffering from hoarseness for four months. There is pain referred to the left side of the thyroid cartilage. There is dysphagia on swallowing saliva, but food passes without discomfort. The patient has not perceived any loss of flesh. The interior of the larynx is almost quite concealed by a pendent epiglottis, but the difficulty may be overcome by using an Escat's retractor. The left side of the larynx, including the cord and supraglottic structures, is red, swollen, and does not move during phonation. Under favourable conditions some ulceration can be seen on the left ventricular band. There is an enlarged gland of the left deep cervical group on a level with the upper border of the thyroid cartilage. Iodide of potassium has proved useless. The case is shown with the view of eliciting opinions as to the advisability of operation.

DISCUSSION.

Sir FELIX SEMON said he was not at all certain that it was malignant disease of the larynx. He had not experienced any difficulty in looking into the larynx. It was not only that the left half was fixed, but also the right vocal cord did not move freely and did not even come to the mid-line, so that a large gap was left between the immobile left half and the right vocal cord. Again, the degree of swelling was much less than he would expect in a case of malignant disease of the larynx involving the epiglottis and the whole of the left half of the larynx. He suspected tuberculosis rather than malignancy.

Dr. MCKENZIE thanked Sir Felix Semon for his opinion. With all deference, however, to his great authority, he (the speaker) ventured to differ from his view that the disease was non-malignant. Since the notes of the case had been sent in to the Secretary considerable change in the local appearances had taken place. There was less swelling and the epiglottis no longer obscured the interior of the larynx. This he attributed to the action of the iodide. There was, he thought, some movement of the left arytænoid, but the corresponding cord did not participate in the movement. This partial movement—partial fixation of one side of the larynx indicating, as it did, circumscribed infiltration—was an appearance extremely suggestive. Taken along with the suspicious ulcer on the left ventricular band and base of the epiglottis, and the enlarged cervical gland, there could, in his opinion, be only one interpretation, viz., malignant disease.

Specimens showing the Pathogenesis of Pachydermia laryngis verrucosa et diffusa.

By W. Jobson Horne, M.D.

The following specimens were shown in illustration of an opinion previously expressed by the exhibitor[1] that, although the hyperplasia may be the result of a persistent laryngitis, pachydermia laryngis cannot always be regarded as having a separate entity. It may be only a local manifestation of a general fibrosis (specimen 1) or of a general infection, *e.g.*, syphilis (specimen 2), or of a localized disease, *e.g.*, epithelioma (specimen 3), or it may be a conservative process to protect the organ and to arrest the underlying disease, *e.g.*, tuberculosis (specimen 4). The sections were cut vertically and at a right angle to the vocal cord.

(1) A section through the ventricular band and vocal cord of the larynx of a man aged 37. The epithelium and subjacent tissue of the vocal cord showed a hyperplasia which had resulted in the development of an excrescence with a sulcus above and below. At the autopsy there was found chronic interstitial nephritis with evidence of fibrotic degeneration in other organs. (A microphotograph was exhibited.)

(2) A section from the larynx of a woman, the subject of tertiary syphilis. There was marked hyperplasia of the squamous epithelium. (A microphotograph was exhibited.)

(3) A section from a case of epithelioma of the larynx. It presented hyperplasia of the squamous epithelium.

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[1] *Lancet*, 1899, ii., p. 607; *Journ. of Laryngol., Rhinol., and Otol.*, 1904, p. 464.

(4) A section through the ventricular band and vocal cord of a larynx in a subject of tuberculosis. In the submucosa were numerous giant-cells and tubercle bacilli. The superjacent epithelium had undergone a hyperplasia. The section demonstrated the process of natural arrest of laryngeal tuberculosis and the conservation of the larynx as arrived at by vocal rest.

(5) A similar section stained to show tubercle bacilli and placed under an oil immersion lens. (A microphotograph was exhibited.)

The specimens indicated some lines of treatment in pachydermia laryngis.

A Case of Hysteria with very unusual Laryngeal Manifestations.

By Sir FELIX SEMON, K.C.V.O., M.D.

THE patient is a schoolmistress, unmarried, aged 28, who, in March, 1907, began to suffer from overstrain. She had what she called "shivering fits" in her head, shoulders, and arms, which gradually became more and more frequent. Next tremor in her arms supervened, and, whilst she was getting better from these manifestations, she experienced in August heaviness in both feet. In September, whilst the weakness in the left leg improved, that in the right became more aggravated, and the tremor and shivering fits recurred. She was admitted into the National Hospital for Epilepsy and Paralysis in October under Dr. Ormerod's care, to whom the exhibitor is indebted for permission to show the case. At that time none of the usual hysterical stigmata were present. There was no anæsthesia, and the field of vision was not contracted. Whilst in the hospital she gradually improved, and in November was much better, so far as the weakness of the leg was concerned; but she suddenly began to stammer. The form of stammering was quite the ordinary one. In January, with a view of creating a mental impression, a faradic brush was applied to her neck, when all of a sudden she became completely mute. She herself tried hard to overcome this defect by over-action of the muscles engaged in articulation, but this was of no avail. She had to communicate with the outside world in writing. This continued until March. In that month the ward sister manipulated her tongue with a view of creating a mental diversion, when the patient suddenly broke into speech, such as she now possesses, and which is the reason of her being demonstrated. It will be seen that, with tremendous effort, and with violent and visible action of the muscles of the face, neck, and particularly those of the mouth, she produces a terrific amount of voice. She is unable to speak otherwise than in this shouting manner, or even merely to produce a soft sound. At the same time her voice is absolutely monotonous, and every syllable is separated by a distinct interval from the preceding one, reminding one of the scanning speech of disseminated sclerosis, of which, significantly enough, an instance was being treated in her ward when she suddenly began to speak as she does at the present time. The difficulty is greatest at the beginning of her speaking, but remains considerable throughout. On laryngoscopic examination nothing abnormal is seen during respiration, but, on being told to phonate, a violent contraction of the larynx, simultaneously with that observed in the muscles of the face, ensues, the epiglottis becomes quite curled and covers the interior of the larynx, the arytænoid cartilages are firmly pressed against one another, the interior of the larynx becomes invisible, and no sound is produced for a long time. The present condition once more for a short time gave way to mutism, but returned as it is now without any cause known. Her gait is rather better; the tremor of the arms is slight. She is being treated now with respiratory exercises and sedatives, but no improvement has as yet been obtained.

The case resembles in some respects two others previously described by the exhibitor: one[1] in which chronic perverse action of the vocal cords suddenly gave way to ordinary functional aphonia when a cold water douche was applied; and another[2] in which trismus of the muscles, not only of the larynx but also of the face and neck, was so great that the patient, a once famous American pulpit orator, was absolutely unable to produce a sound. What the exact mechanism is by which such "crosses between paralysis and spasm," as they were called in the German edition of Mackenzie's text-book, are produced it is impossible to say, and the exhibitor would also refrain from discussing whether the extraordinary manner of speech now present in this patient is an unconscious imitation of the speech of disseminated sclerosis as witnessed by her.

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[1] German edition of Mackenzie's "Diseases of the Throat and Nose," 1880, i., footnotes pp. 614 and 659.

[2] Heymann's "Handbuch der Laryngologie," i., p. 749.

The PRESIDENT said he did not think hysterical mutism was very common. Cases appeared to recover in various ways. He had seen two cases: one was a woman, and she began to improve by picking up simple words, such as "yes" and "no," in the same way as an aphasic patient would. The last time he saw her she could use a great many words. The other case was that of a man whom he showed at another society some years ago. He succeeded in bringing back his speech by means of a very severe faradic shock, after which he spoke in a very low voice for some months. He then became completely mute again and was an inmate of one of the infirmaries, where he remained three or four years. In a Sunday paper he (Dr. Ball) saw a heading "Remarkable Recovery of Speech," and the subject of it turned out to be his old patient. It appeared that a bottle of soda-water, which he had been trying to open, burst in his hand, and his speech came back. The present patient had passed from her mutism into an extraordinarily loud spasmodic way of speaking. The case was a remarkable one in many ways.

A Case of probable combination of Tuberculosis and Syphilis in the Larynx.

By Sir FELIX SEMON, K.C.V.O., M.D.

THE patient is a male, aged 44. In August, 1902, considerable swelling of right arytænoid region and infiltration of right vocal cord were observed. There were no chest signs and no tubercle bacilli, but laryngeal appearances so suspicious of tuberculosis that patient was sent to a sanatorium. A large, sharply cut, oblong ulcer developed in the posterior part of the right vocal cord, which remained much swollen and congested, the movements of the right half of the larynx also becoming deficient. In spite of the absence of a syphilitic history, syphilis was suspected and antisyphilitic treatment instituted. The laryngeal condition did not improve at first, but the iodide produced a slight amount of secretion, and in this a very small number of tubercle bacilli were detected. Gradually the larynx got better, the swelling and ulceration of the right vocal cord diminished, its mobility improved, and the tumefaction of the right arytænoid cartilage distinctly decreased. A course of mercurial inunctions was instituted, and the patient got practically well and remained so for about five years, but in April of this year, first on the right, and a few days afterwards on the left ary-epiglottic fold, suspicious-looking white patches developed, much resembling ordinary condylomata lata as seen in the pharynx. The patient stated that early this year a rash, which was supposed to be syphilitic, had appeared on his skin. Under antisyphilitic treatment within a few days the white patch disappeared on the left side, and that on the right became much smaller.

Six weeks later the condition had again materially deteriorated. When seen on June 1 his voice was very hoarse, and it was noticed that instead of the white spot previously seen on the posterior aspect of the right arytænoid cartilage, there was now extensive ulceration extending to the posterior part of the right ventricular band and ary-epiglottic fold, whilst the right cord throughout its length was very œdematous. Its movements are not hampered. Energetic antisyphilitic treatment has been instituted. There have been no recent symptoms pointing to recrudescence of tuberculosis, either in the chest or generally.

DISCUSSION.

Dr. WATSON WILLIAMS said the combination of the two diseases was intensely interesting, and he published, many years ago, a case in which apparently there was such a combination. The syphilitic lesions seemed to improve under antisyphilitic treatment, but not the tuberculosis; rather the reverse. One would be chary of making a diagnosis in such a case as the present without watching it for some little time.

Dr. STCLAIR THOMSON said he thought the present appearances were much more suggestive of tubercle than of syphilis, but possibly there was a syphilitic basis.

Dr. DE HAVILLAND HALL said some such cases were extremely difficult to diagnose. Four or five years ago he had the case of a lady who came with what appeared to be a tubercular ulcer of the larynx. She certainly had some mischief in her right apex, tubercle bacilli were present in the sputum, and the diagnosis seemed complete. Lactic acid was then being extensively used for tubercular lesions, and he applied it vigorously thirty or forty times, with some amelioration of symptoms; the ulcer cleared up to some extent, but there came a time when it was stationary. Though there was no syphilitic history he started her on small doses of iodide, and there was some improvement; he therefore went on to 20 gr. three times a day. This resulted in very rapid and eventually complete removal of the symptoms. In all such cases, therefore, the patient should be given the benefit of the doubt. If it was tuberculosis and there was tubercle in the lung, iodide might do harm: in from two to ten days there was an increase in the physical signs in the lungs. One or two cases of the kind he had seen. That morning he had seen a youth aged 20 who had syphilitic ulceration of the pharynx and larynx. He had a marked tubercular history, and it seemed to be a tuberculous case. However, to give him the benefit of the doubt, he gave iodide of potassium, and in five weeks he had increased 6 lb. in weight, and the ulceration was now rapidly clearing up. There was no history or sign of inherited syphilis.

Mr. DE SANTI said that some years ago a woman came to his out-patient clinique with definite tubercular mischief in the lungs. She had been seen by a physician, and tubercle bacilli were found in the sputum. There was an involvement of the larynx, and his colleague had treated the case entirely as tubercle, but the patient was rapidly going down hill. On examining her Mr. de Santi was struck by the loss of the bridge of the nose, and he found that the whole septum had been eaten away and was in an active stage of ulceration. He had never seen such a condition in tubercle, and regarded it as specific, or at all events as a case of mixed infection. He put her on iodides, and from that time her condition began to clear up. She eventually got rid of her trouble in the larynx, nose, and lungs. Some months afterwards he injected paraffin into the bridge of the nose. In Sir Felix Semon's case he thought the appearance more that of tubercle than syphilis, but he would put the patient on iodide.

Sir FELIX SEMON, in closing the discussion, said he brought the case forward because he thought it would be interesting, seeing how much the manifestations of either of the diseases might be modified by combination with the other. Had he seen that patient that day for the first time he would not have made a definite diagnosis, as he did not think the conditions were characteristic of either disease. Dr. Thomson thought the condition of the cord was characteristic of tuberculosis, but surely there was not pseudo-œdema, but a very real œdema of the vocal cord. Of all parts of the larynx the cords were the last to become œdematous, because of their firm texture, and for a vocal cord alone to be so œdematous was a very rare occurrence, which he did not regard as characteristic of either syphilis or tuberculosis. He regretted the Section could not see the varying character of the laryngoscopic appearances. When first a white patch appeared on the posterior surface of the right arytænoid cartilage it looked like an ordinary condyloma in the pharynx, and when the corresponding part on the left side afterwards developed the same appearance he thought that everybody would have said it was syphilis. There seemed to be no possible mistake about it, although the localization was unusual. Then suddenly the white patch began to break down on the right side, and deep ulceration developed, extending from the arytænoid cartilage on to the ventricular band. That, surely, was not characteristic of either tuberculosis or syphilis. When antispecific treatment was being given the patient quickly got much better. The condition on the left side disappeared completely, that on the right side returned to the previous curious white discoloration. That strongly supported the idea that the manifestations at that time were more syphilitic than tuberculous. He proposed to continue the antisyphilitic remedies, although he was conscious of the truth of what Dr. de Havilland Hall said as to the need of care in the administration of iodide of potassium when pulmonary tuberculosis was present, as in some cases that form of treatment actually might aggravate the condition. He gave the iodide of potassium with some fear and trembling when he saw the great œdema of the right vocal cord. It was well known that iodide of potassium sometimes actually caused laryngeal œdema, and to administer it where partial œdema of that region was already present seemed hazardous, but no accentuation of the œdema had taken place.

An X-ray Photograph showing a Hajek's Hook in the Right Sphenoidal Sinus.

By H. J. Davis, M.B.

The patient was a girl aged 18. The photograph was taken by Dr. Melville at the West London Hospital. The patient was lying down on her side. The outlines of the sinus and surrounding structures are remarkably well defined. The bend of the hook is in the centre of the sinus and the shank is seen entering the cavity through the ostium.

Specimens showing Normal and Hypertrophied Pharyngeal Tonsils in Southdown Sheep.

By H. J. Davis, M.B.

The animal with the hypertrophied pharyngeal tonsil ("adenoids") had enlarged faucial tonsils as well. These were also exhibited. The shape of the vegetations appears similar to that found in human beings. The sulci are well marked, but the growth is paler and softer. The specimens were removed by the exhibitor after death. The animals were 2 years of age.

Specimen of a large Pedunculated Fibroma (? Fibromyxoma) removed from the Vault of the Naso-pharynx of a Boy aged 9.

By H. J. Davis, M.B.

The growth was removed with a ring knife, as it was found impossible to encircle it with a snare.

Specimen from the Case of a Woman with a supposed Cyst on the Floor of the Right Naris.

(With Microscopic Specimen.)

By H. J. Davis, M.B.

The patient, a woman aged 50, was shown before the Section at the April meeting.[1] On the suggestion that the "cyst" was of dental origin the right canine was extracted. Ten days ago the growth was removed under chloroform. It was firmly adherent to the surrounding parts. The bone was expanded in all directions, and this expansion probably accounted for the pain experienced by the patient. The growth, as can be seen, is quite solid, and has not the least appearance of a cyst; it is a fibroma.

Further Notes on the Case of a Woman aged 27, with almost complete Nasal Obstruction on the Left Side, with inability to clear the Nose.

By H. J. Davis, M.B.

The patient was shown before the Section at the March meeting.[2] On examination under chloroform the obstruction was found to be due to the presence of a thick yielding membrane stretching from the septum to the outer nasal wall. There was a fine perforation in the upper part through which the small celluloid bougie referred to at the March meeting could occasionally be passed. With one finger in the left choana, which was narrower than the right, and an instrument pressed firmly backwards through the nostril, the membrane could just be felt with the finger; a curved bistoury was passed into the nose and the oval flap removed with some difficulty. It consisted of thickened mucous membrane, was not cicatricial tissue, and was evidently of congenital origin. There was no deviation of the bony septum as the exhibitor and others had supposed, nor any bulging of the inner antral wall. The nose was packed for twelve hours only, and the patency of the channel maintained by daily forcible syringing (aural syringe) through the opposite nostril. This method prevented the edges of the wound from becoming adherent, as probably would have occurred if other methods had been employed. The nasal passage is now patent.

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[1] *Proc. Roy. Soc. Med.*, 1908, i., No. 7 (Laryng. Sect.), p. 97.

[2] Op. cit., 1908, i., No. 6 (Laryng. Sect.), p. 75.

Dr. PATERSON said he agreed that the membrane was probably of congenital origin. It could be well explained from a developmental point of view. The primitive choanæ in mammals arose by the opening of the posterior end of the nasal blind sac from absorption of the bucco-nasal membrane, and it was probably the remains of this membrane which had not been completely absorbed in this patient.

A Case of Neoplasm of the Right Tonsil.

(With Microscopic Section.)

By CHARLES A. PARKER, F.R.C.S.

THE patient, a female aged 23, first noticed a sensation of a lump in the throat in August, 1907. She came to hospital on August 6, when ordinary chronic enlargement of the right tonsil was diagnosed, and the tonsil was removed with a tonsillotome. The diagnosis was confirmed by microscopic examination. A rapid recurrence occurred, and three weeks later the tonsil had grown to the size it was before removal. It looked firm and felt hard. On October 29 a snare was passed round its attachment to the wall of the pharynx and the tonsil was again removed, and again it was found to be microscopically normal tonsillar tissue with increased fibrous tissue. The wound did not heal satisfactorily, and its edges rapidly increased in size, causing an appearance of a deep punched-out ulceration. This remained stationary for a time, and then the patient was lost sight of for four months.

She returned on May 7, 1908, with an extensive growth involving the tonsillar region, the soft palate of the anterior faucial pillar, base of the tongue, and lateral wall of the pharynx. In one portion there was deep ulceration, with hard everted edges. A piece of the thickened edge was punched out, but only showed normal hypertrophied epithelium. There was some enlargement of the cervical glands, but no enlargement of the spleen or of glands elsewhere in the body. Under iodide of potassium the patient seemed to get rapidly worse, whilst under arsenic the pharynx has become cleaner and healthier in appearance, though the growth has not diminished in size. Clinically the growth is unquestionably malignant, extending rapidly and infiltrating surrounding structures; but microscopically there is nothing to suggest this. The section shown is from the growth removed on the second occasion. It is suggested that the extent of the growth renders operative treatment impossible.

DISCUSSION.

Mr. CRESSWELL BABER said he regarded it as a lymphoma of the tonsil, and that it reminded him of a case he had published some years ago,[1] that of a girl aged 14, whose enlarged tonsils were excised in the ordinary way, but grew again. They kept growing and had to be removed repeatedly in order to prevent her choking. She finally died of pneumonia. The microscopical appearance in the present case rather bore out that diagnosis. He asked whether any glands other than those in the neck were enlarged in the case. In his own case the glands in various parts were much enlarged, but that enlargement disappeared the day before death. Arsenic was tried in the case, but without good result.

Dr. LAMBERT LACK said he had had a previous opportunity of seeing the case, and agreed with the diagnosis of lympho-sarcoma. The microscopical section also bore out that view. He had carefully examined it, and it was not normal tonsillar tissue.

Mr. HERBERT TILLEY said such cases improved under arsenic, but at a certain stage that betterment ceased and the patient went down hill. If large doses of arsenic were given in this instance the throat might be improved, but the patient would probably get arsenical neuritis. It was necessary to be careful not to raise false hopes. Three years ago he showed a young man with lympho-sarcoma of the tonsil in which that series of events occurred.

Dr. DE HAVILLAND HALL said he had had under his care a doctor's wife with lympho-sarcoma. She had seen many physicians and surgeons about her tonsil and derived great improvement under arsenic, but during the last months of her life she had arsenical neuritis, and was so miserable in consequence that he regretted having pushed the drug. The benefit was only temporary, and she died with diffuse sarcomatosis.

Dr. DONELAN said it could not be contended that either arsenic or iodide of potassium had the smallest effect, even of a temporary character, on the malignant tissues. What happened in the case first referred to was what took place in other forms of malignant disease that apparently benefited from the use of drugs. The zone of inflammatory reactive tissue was reduced by the action of the drug for a time, but soon recurred in spite of the largest doses, on account of the inevitable advance of the malignant elements. It was, of course, something to be able to give temporary relief in inoperable cases.

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[1] *Archives of Otol.*, xxi., No. 2.

Dr. DAN MCKENZIE said he was quite convinced that the glands themselves in lymphadenoma underwent reduction in size during the administration of arsenic. The disease seemed to be due to some infection. As a rule the cervical glands were the first to become enlarged, but he remembered having a case under his care some years ago in which the disease attacked the left axillary glands first. In this case there was definite ulceration of the left nipple. This experience, added to the rule that the cervical glands were usually the first affected, suggested an infection which in the case of the neck probably obtained an entrance by the tonsillar crypts, carious teeth, &c.

Mr. PARKER, in reply, said that since the notes of the case had been sent in ten days ago the growth had made very rapid progress in spite of the administration of arsenic.

A Case of Pulsating Angeioma of the Nose.

By W. D. HARMER, F.R.C.S.

THE patient is a girl aged 10. The history is indefinite; the growth was not noticed at birth, but has existed for at least six years. She first attended the hospital in March, 1905, with typical subcutaneous nævus, and was treated by cautery puncture. This was repeated in March, May and September, 1907, and the growth was apparently arrested. Pulsation was first noticed in the early part of this year, and is now seen on the right side and tip of nose and in the right infra-orbital region; also above the inner canthus of the right eye, in the right upper lip, and right carotid region. No pulsation is visible within the nose. Pulsation does not disappear with compression of the facial arteries alone, but ceases with pressure upon the infra-orbital vessels and right facial artery; also with pressure on the right carotid. A loud murmur is heard over the tumour. The condition is progressing.

DISCUSSION.

Mr. DE SANTI said he thought it difficult to say what operation could be done. Nothing short of ligation of the big vessels feeding the affected part would be likely to benefit the patient. It somewhat resembled, from an operative point of view, a cirsoid aneurysm of the scalp.

Dr. DAN MCKENZIE asked whether any member had heard of the treatment by Payr, of Graz, for pulsating angeiomata. Payr, he believed, injected through a cannula small solid magnesium pellets or "arrows," several of the arrows being injected at one sitting. Magnesium in contact with the blood and tissues becomes slowly oxidized, and in the process the blood is decomposed, with the evolution of hydrogen. As a result a coagulum is slowly formed around each "arrow" and the tumour undergoes a shrivelling up. An account of Payr's method was to be found in the *Centralblatt für Chirurgie*, and the arrows of magnesium, cannula, &c., could be obtained from Messrs. Rohrbeck, 1 Kartnerstrasse 59, Vienna. The speaker was indebted to Dr. Macallum, of Melbourne, for this information. Dr. Macallum had tried the treatment and had found it very successful.

Mr. HARMER, in reply, said he thought it an unusual case. The tumour was increasing in size. Though originally a cavernous nævus, it had now begun to pulsate; the vessels which supply the tumour were also enlarging, and he supposed some form of treatment was imperative. If he were to ligature the facial and infra-orbital vessels on the right side, he supposed the growth would obtain a supply from the orbital vessels. Possibly, by means of some instrument, continuous pressure could be exerted so as to control the pulsation. He had not heard of the magnesium method mentioned by Dr. McKenzie.

A Case of Swelling of the Tonsil.

By H. BUCKLAND JONES, M.B.

THE patient is a man of middle age. There was a history of probable syphilis twenty years ago, but there was no rash nor affection of the throat, and treatment was only continued for a few weeks. He attended hospital two years ago with a bad throat, which got well after three months treatment. On the present occasion the patient attended the hospital complaining of the right ear and nose, and of very slight bleeding from the throat. There was slight pain on swallowing of six months duration. On examination there is a dark red swelling involving the right tonsil and right side of the soft palate. The swelling is firm and brawny on palpation, and only slightly tender. No ulceration is present. One small gland is palpable at the angle of the jaw on the right side. Iodides have been administered for nearly a month, during which time the swelling has gradually increased and the patient has lost weight. A piece of the right tonsil has been removed for examination. The epithelium covering the lymphoid tissue is benign; there is some fibrosis of the parenchyma of the tonsil.

Dr. James Donelan showed :—

(1) *A case of ethmoidal and sphenoidal suppuration.* The patient a woman of middle age, had a cleft-palate, which afforded a good post-nasal view.

(2) *A specimen of unusually large left sphenoidal sinus with intact septum between the sinuses.*

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE FIRST

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1907-8

MEDICAL SECTION

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1908

LONDON:
JOHN BALE, SONS AND DANIELSSON, LTD.,
OXFORD HOUSE,
GREAT TITCHFIELD STREET, OXFORD STREET, W.

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MEDICAL SECTION.

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The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

Medical Section.

October 22, 1907.

Dr. GEE, President of the Section, in the Chair.

The PRESIDENT said the Council had requested him to make a few introductory remarks before the Section proceeded to business. Fellows would remember the tale told by Plutarch of the best of all his heroes, how that one day Phocion was seen to be walking in a thoughtful mood, when a friend came up to him and asked him what he was thinking about. The reply was that he was thinking how he could shorten what he had to say to the Athenians. A similar frame of mind had been his (Dr. Gee's) during the last few days, and his hearers would rejoice to be told that he had succeeded in reducing what he had to say to two items which had occupied the attention of the Council. In the first place, theirs was the Section of Medicine. But what were they to understand by the term "medicine"? What was its domain? What did it include? An ancient Greek would have had no difficulty in answering the question; he would have replied, in the words of Plato, "Is not medicine the science of health?" But in drawing up the list of Sections of the new Society the logic of fact had compelled them to disregard intellectual logic; in short, they had been unable to indulge in the luxury of any consistent principle of classification or, to use a technical term which he was taught when he learned logic, in the present scheme of Sections there was no *fundamentum divisionis*. They had agreed to make medicine a Section of Medicine itself, and side by side with other Sections which were and were not medicine. For it had happened to medicine exactly as it happened to philosophy. He reminded his hearers of the vision which Boethius saw in his prison at Pavia. Philosophy appeared to him in the form of a woman, majestic and venerable, clad in an imperishable robe, which she had woven with her own fingers. But the beauty of her vesture had been defaced by violent hands, which had each torn away as much as it could clutch. Those were the many sects or sections of philosophy. It was the same with medicine. First, surgery arose, and made so huge a rent that she claimed and obtained equality in the Royal Medical and Chirurgical Society. Afterwards, and even within his own lifetime, sects and societies had arisen too numerous to mention, which had committed such ravages upon Medicine's garment that they had hardly left their ancient parent raiment enough to clothe herself withal. Fellows would see the nature of the difficulty which confronted them, and he thought they must trust to time to solve it. The only advice he could offer was that they must never lose sight of the universal aspect of medicine: they must not forget that it remained *primus inter pares.* To put an extreme case or two, to make his meaning clear. Supposing a paper on a surgical subject were offered the Section for reading. Well, yes, the great Hippocrates wrote two admirable treatises upon fractures and dislocations. Or should an obstetrical paper be brought before them, they would remember that the great Harvey practised midwifery. And so the Section would bear aloft the ancient banner, and look with a kindly eye upon Sections and Subsections, how numerous soever, for they were all their offspring, nor could they deny their pedigree, even if they would.

The other topic upon which he must speak was the following. The attendances at the meetings of the old Society had become very small of late years. No doubt the main explanation of that fact was to be found in the increased number of medical societies. But the Council thought that the old time of meeting was inconvenient, by reason of the fashionable dinner hour becoming later and later. Therefore the Society proposed, by way of experiment, to follow the example of some other societies and meet at 5.30 p.m.

Nothing remained for him but, on launching the new Society, to send along with it, in the name of the Fellows, their best wishes for its prosperity and usefulness in the future.

Pneumonia and its Complications.

An Address introductory to a Discussion on the Subject.

By Hector Mackenzie, M.D., F.R.C.P.

For the inaugural meeting of this, the Medical Section of the new Royal Society of Medicine, it would not have been possible to have selected at the present time any subject for discussion of greater interest and importance than that of the complications of pneumonia and its treatment by means of serums and vaccines. It is needless for me to dwell on the ravages caused by pneumonia, a plague at the present time more fatal and disastrous to our own population, as I have elsewhere pointed out, than typhoid, diphtheria, small-pox, measles and scarlet fever all combined, and responsible for a large proportion of the deaths at the two extremes of life. It differs from these specific fevers inasmuch as it only rarely appears in an epidemic form, does not generally seem directly communicable from one person to another, and depends on the invasion of the body by a micro-organism which usually appears to be innocuous, and is almost constantly to be found present in the secretions lining the mucous membranes of the mouth and nose and other parts of the upper respiratory tract.

Pneumonia, in fact, is due to a parasite which ordinarily we do more than tolerate, to which we habitually afford house and home, and with which usually our relations may be said to be of a friendly character. A man's most deadly foes, however, may be those of his own household, and this is certainly the case with regard to those parasites, the pneumococcus and the *Bacillus coli*, which are always with us. Against our open enemies, such as the bacilli of typhoid, diphtheria, cholera, plague and tubercle, &c., we can and do adopt preventive measures, but what have we done so far to protect ourselves from those secret and still more dangerous enemies which are always at our doors? There is much wisdom in the words which the old Venetian prisoner wrote on the walls of his cell:—

"Di chi mi fido guardami Iddio,
Di chi non mi fido mi guarderò io."

The pneumococcus is an organism which must not be treated as if it were ever harmless, but as one which is always dangerous, always hostile, and against which we ought to adopt preventive measures. The pneumococcus is a strict parasite and does not appear to be able to flourish apart from an animal body, except in culture mediums. It is evidently an air-borne parasite, as it is the surfaces of mucous membranes most accessible to the air which it infests. The proportion of normal individuals in whom pneumococci are found to be present has been generally given as from 15 to 20 per cent. for the mouth and 24 per cent. for the nose. But the latest investigations of the Medical Commission for the Investigation of Acute Respiratory Diseases of the Department of Health of New York[1] put it still higher, Buerger having found them in the mouth of 39 out of 78 normal individuals, or 50 per cent., while Duval and Lewis isolated them in every instance from the saliva of healthy individuals. Hiss says it is more than probable that practically every individual acts as a host to organisms of true pneumococcus type at some time or other at least during the winter months, and probably at repeated intervals. The organisms leave the body with the saliva or sputum, and in either moist or dried sputum may remain virulent for a considerable time. Pneumococci have been found by various observers in the dust of hospital wards and other places. It is probable that it is through the objectionable habit of spitting that the pneumococci become so generally disseminated, especially during the winter months. Spitting in all enclosed spaces should be forbidden as much on account of the pneumococcus as of the tubercle bacillus.

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[1] *Journal of Experimental Medicine*, 1905, vol. vii., pp. 401-419.

When we consider how frequently the pneumococcus is harboured in the mouths of normal individuals it is clear that, ordinarily, either its virulence is low or the resistance of the body is high. Some authorities have said that there is no difference to be observed in virulence between a culture obtained from the mucous membrane of a healthy person and one from a case of pneumonia or other pneumococcic infection. Eyre and Washbourn,[1] and Park and Williams,[2] however, found that cultures from cases of pneumonia were more virulent for rabbits than those from normal persons. The observations of Longcope and Fox [3] suggest that there is a seasonal variation to the virulence of the pneumococci in the mouths of healthy individuals, virulent forms being more common during the winter than during the late spring.

It appears to be more than probable that, naturally, there is a considerable degree of resistance or immunity inherent in the human body, and it helps us to understand the nature of the disease and its complications if we consider some of the results of the attempts which have been made to produce pneumonia experimentally in animals. The recent investigations of Dr. Wadsworth [4] in this direction are of great interest. Previous experimenters, whether they introduced the pneumococci into the animal's body subcutaneously or intravenously, uniformly failed to produce pneumonic lesions in the lungs. In the case where the virus was introduced by inhalation or by injection into the trachea, occasionally and exceptionally pneumonic patches were produced, but more commonly the lesions resembled those of bronchopneumonia. Dr. Wadsworth, however, by previously immunising rabbits and then introducing highly virulent pneumococcic cultures by tracheal injection, directing them as far as possible into one lung, succeeded in producing the typical lesions of acute lobar pneumonia. In producing pneumonic lesions experimentally there were two factors which had to be nicely balanced, the virulence of the cultures and the susceptibility of the animal. Dr. Wadsworth first tried the effect of diminishing the virulence and increasing the susceptibility, but the results were uncertain and unsatisfactory, and the animals as a rule died from acute bacteriæmia. Where cultures of low virulence were introduced intratracheally, in only one out of three rabbits rendered highly susceptible did he succeed in producing typical pneumonic lesions. When he lowered the susceptibility and increased the virulence the case was altered. Out of eleven rabbits which he had previously immunised, none died as the result of injecting into the trachea highly virulent cultures, but a few were rendered seriously ill for from twenty-four to thirty-six hours. When killed at the end of three and four days respectively, they were all found to have typical pneumonic lesions. Out of five control animals not previously immunised but similarly treated, three died within forty-eight hours without obvious lung lesions, while the other two had atypical lung lesions. These experiments support the view which, after a careful survey of the subject, I am inclined to take, that pneumonia is a local infection of the lung which the virus reaches through the respiratory tract, there usually setting up a strong local reaction, a defensive process which is Nature's way of preventing, if possible, an acute bacteriæmia. Locally the micrococci multiply and thence make their way into the blood, for it would seem that a certain degree of bacteriæmia always does occur. In the majority of cases, however, the leucocytes of the blood are able to prevent the body from being overwhelmed by the bacteria. The bacteria cultivate themselves or maintain their existence for a time in the lung, which appears to be for them a region of what Sir Almroth Wright has called lowered "bacteriotropic pressure," a region where antibacterial substances are either absent from the tissue fluids or are there contained in diminished quantity. The bacteria which are carried from the lung into the blood stream do not as a rule succeed in maintaining their existence there, but they may be carried to almost any part of the body and find a footing there. In the great majority of cases the battle between the body tissues and the pneumococci is fought to a decisive finish in the lungs, terminating in recovery or death. Where the anti-bacterial substances are plentiful, as in the young, recovery is the usual termination; where they are deficient, as in infancy and after middle life, death is extremely common.

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[1] *Lancet*, 1899, vol. i., p. 119.

[2], [3] *Journal of Experimental Medicine*, 1905, vol. vii., *loc. cit.*

[4] *Amer. Journ. Med. Sci.*, 1904, vol. cxxvii., p. 857.

The recent investigations of Rosenow[1] are confirmatory of Prochaska's observations as to the almost constant presence of the pneumococcus in the blood in cases of pneumonia. Rosenow found the microbe in the blood in 132 out of a total of 145 cases in which he took cultures, while Prochaska found it in every one of 50 cases investigated. It is therefore clear that the resistance of the body, especially during the period of life at which the mortality is low, is very considerable.

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[1] *Journ. of Infect. Diseases*, March 19, 1904, p. 280.

In the case of all the complications except those in or near the lung, the microbes reach the organs or tissues, in which they set up inflammatory changes through the blood current. The occurrence of complications at a considerable interval of time after the primary lesion is explained by the fact that, as shown by Tizzoni and Panichi[1] in the case of immunised animals, it is possible for pneumococci to remain in the circulating blood for days, weeks, and even months. The toxin produced by the bacteria is probably the cause of the graver constitutional symptoms, and the crisis is the result of the neutralisation of the toxin by an antitoxin produced by the body. Attempts, however, to obtain the toxin artificially from cultures have not been successful; in fact, according to Welch,[2] it is bacteriologically impossible to do so, nor has it been possible to produce a serum having antitoxic properties. Animals can be successfully immunised, but their serum is antibacterial, not antitoxic. It is on this account that serum treatment of pneumonia and its complications has hitherto been so unsatisfactory, so uncertain and so inconclusive.

It is the complications of pneumonia to which we have specially to direct our attention this afternoon, and by far the most common of these is pleurisy, and the most important is empyema. Taking all cases of empyema, we find that the pneumococcus is the cause of the disease nine times out of ten, the other organisms which account for the remainder being chiefly streptococci, staphylococci, and tubercle bacilli. In 69 cases of empyema in children reported by P. Stanley Blaker,[3] a bacteriological examination was made, and in all but four the diplococcus was found, and in only four cases was it associated with other micro-organisms. In a series of 2,440 cases, pleurisy with serous effusion was observed 54 times, and empyema 28 times. One case, therefore, in 45 had pleurisy with effusion, and one in 90 had empyema. A point about empyema which it is difficult to explain is its greater frequency on the left side than on the right, while pneumonia itself is more common on the right side. One would have expected that right-sided pneumonia would as frequently be followed by empyema as left-sided. Empyema may occur on the side opposite to that of the pneumonia, but it certainly appears most commonly on the same side. Speaking from my own experience, I believe that a pleural effusion after pneumonia is far more commonly purulent or sero-purulent than serous, and therefore I only give the figures I have mentioned for what they are worth. I am accustomed to tell my students that the history of the illness is the most important point of distinction between serous and purulent effusions. If there be a history of illness with an acute onset, the effusion is almost certainly purulent and pneumococcic; if there be a history of gradual onset, the effusion is probably serous and tuberculous. Usually the illness due to an empyema is separated from that due to pneumonia by an interval of a few days. Empyema should always be thought of when, after the time of the crisis, pyrexia continues or returns. When an empyema has been successfully diagnosed it should be treated by incision with resection of rib and drainage. The most difficult cases of empyema to discover are those where there is a loculated collection of pus. Except, however, where the empyema is situated between the lobes, or between the lung and the diaphragm, it is not a difficult matter to locate the abscess.

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[1] *Centralbl. f. Bakteriologie u. Parasitkunde*, 1905, Band xxxvi., p. 25.

[2] *Med. News*, Philad., 1904, vol. lxxxiv., p. 816.

[3] *Brit. Med. Journ.*, vol. i., 1903, p. 1200.

With regard to pleurisy with serous effusion, I cannot recall any case of an effusion complicating pneumonia that I considered large enough to tap which proved to be serous. The fluid has always been either sero-purulent or purulent. I note that at St. Thomas's Hospital no case of pleural effusion requiring aspiration has been recorded in the ten years included in the statistics.

Gangrene of the lung was observed three times among 2,440 cases. It is fortunately a rare complication, for it is very fatal. When it occurs prostration, dyspnœa, and high fever are usually present. Fœtor of the breath and fœtor of the sputa are usually, but not always, present together, and are generally intense and intolerable. The sputa are always diffluent, often of a dirty brown or chocolate colour, sometimes like pure blood, and sometimes of a greenish-yellow colour. The amount of the sputa varies in different cases. Death usually occurs from the fourth to the fourteenth day after the first appearance of signs of gangrene. When the gangrene is diffuse, as it generally is, recovery is scarcely possible, but in circumscribed cases the gangrenous mass may soften, and end in an abscess which may be surgically dealt with.

Abscess of lung is, according to statistics, an even rarer complication than gangrene, of which it is sometimes the termination. It is generally single and of small size, very seldom larger than an orange, and usually consists of an irregular ragged cavity, with purulent, sometimes necrotic, contents, in the midst of softened tissue, but in rare cases it may be bounded by a thickened wall lined with pyogenic membrane. The diagnosis of abscess of the lung is a matter of considerable difficulty. There is usually pyrexia of a hectic type, pyrexia which is higher and more persistent than that of delayed resolution. The physical signs are generally ill-defined, and perhaps only after careful and repeated examination is there found to be a patch of localised dulness, with absent or diminished breath sounds, over which there is tenderness on firm pressure with the finger. It is additionally significant when friction is to be heard over the area of local dulness and tenderness. In cases where abscess has followed gangrene, fœtor of breath is present. Sometimes abscess of lung is not recognised until it is discharged by rupturing into the bronchi, when a considerable amount of pus is suddenly expectorated, with abatement of pyrexia, and improvement in the general condition. A white cell blood-count may be a help, for abscess of lung would be unlikely in a case in which there was no leucocytosis and no relative excess of polymorphonuclear cells. When the signs and symptoms point to the existence of an abscess an exploration should be made, and if pus be found the abscess should be freely opened up. Abscess of lung is commonly fatal, and most frequently is only discovered at the autopsy.

My impression is that chronic pneumonia is an unusual and quite exceptional termination of acute pneumonia. I have seen only two or three undoubted cases. After the acute stage has passed away a moderate degree of pyrexia persists, cough continues with mucous or muco-purulent expectoration, there is persistent shortness of breath, with probably some pain in the side, and the physical signs of consolidation do not disappear. The symptoms gradually diminish, but cough, with scanty expectoration and some dyspnœa, may long remain, and it is usually some weeks and may be some months before complete recovery ensues. The more protracted cases closely resemble chronic pulmonary tuberculosis, and should be treated on similar lines. The absence of tubercle bacilli in the sputum, and a normal tuberculo-opsonic index record, are important points of distinction.

Pericarditis is the next most frequent complication after pleurisy. It was observed in 54 among 2,114 cases not included in this investigation, and of these 43 proved fatal. Infection of the pericardium is probably more commonly carried by the blood stream than by simple extension from the lung. This complication is attended with a high rate of mortality, and not many cases in which pericarditis is recognised during life recover. Frequently the existence of pericarditis has only been discovered at the autopsy. Out of 31 cases of pericarditis among 665 cases of pneumonia reported by Chatard,[1] in only 13 was the condition diagnosed. Of the 31, two recovered and 29 died. In 19 the pneumococcus was isolated from the pericardial exudate. In only 3 cases was the effusion at all plentiful. It was fibrino-serous in 9, fibrino-purulent in 10, fibrinous in 8 and purulent in 2. The recognition of pericarditis is at present more important from the point of view of prognosis than of treatment; but, looking at it as a sign of serious blood infection, I consider that vaccine treatment may possibly prove beneficial in these cases. Occasionally pericarditis leads to pyopericardium, and this complication should be borne in mind, especially in cases in which the presence of affection of the pericardium has been recognised. The area of cardiac dulness becomes greatly increased upwards and outwards, and the heart sounds at the same time are muffled and feeble. Pyopericardium should be treated by incision and drainage, but even then recovery is the exception.

Preble,[2] in an important paper to which I am much indebted, gives the frequency of endocarditis as about 1 per cent.: 126 cases of endocarditis were noted among 11,243 cases of pneumonia. The proportion among fatal cases was higher, 86 cases among 1,775, or nearly 5 per cent. Out of 1,575 cases I have collected, there were 16 cases of endocarditis, and out of 474 fatal cases, 13 of endocarditis. One out of every four cases of ulcerative endocarditis is due to the pneumococcus. It would seem that the aortic valve is specially likely to be involved, for it was affected in over half of the recorded cases. The tricuspid valve was affected in 10 per cent. of the cases. The largest proportion of the cases occur over the age of 30, and pneumonia is more likely to be complicated with endocarditis in the female than in the male. There is seldom evidence of endocarditis until after the ordinary fever of pneumonia has passed off. As in the case of empyema, an interval of apyrexia follows the primary pyrexia, but this interval, however, usually lasts only a few days. The symptoms of endocarditis are as well or as little defined as in cases arising from other causes. It is important to bear in mind that the physical signs of endocarditis may be absent. Endocarditis should be suspected when, after pneumonia, a remittent type of pyrexia persists without there being evidence of lesions in other organs or parts of the body to account for the febrile temperature. The probability of endocarditis being present is increased if there is marked anæmia. The appearance of a diastolic murmur, or a tricuspid murmur, or a systolic murmur conducted towards the axilla, would confirm the diagnosis. Sometimes, however, it is not until the detachment of emboli that it is possible to make certain. In other cases endocarditis is not suspected previous to death. The discovery of the pneumococcus in the blood in doubtful cases is important confirmatory evidence.

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[1] *Johns Hopkins Hospital Bulletin*, vol. xvi., 1905, p. 334.

[2] *Amer. Jour. Med. Sci.*, vol. cxxviii., 1904, p. 782.

The prognosis of pneumococcic endocarditis is certainly grave, but the possibility of a rheumatic origin for endocarditis must be kept in view. Among Preble's 132 cases there were but four recoveries, and in three of these the diagnosis was incomplete. Meningitis was among these cases a frequent associated complication, but this has not been so in the present investigation. At present one's hopes must rest on vaccine or serum treatment. A case of recovery after serum treatment has been reported by Dr. Newton Pitt, and I shall refer later to a case of recovery after vaccine treatment reported by Dr. O. Boellke.

Pneumococcic peritonitis perhaps arises more commonly through primary infection of the peritoneum than as an affection secondary to pneumonia. It is likely, however, that in some cases the primary pneumonia has been overlooked, especially when one remembers how frequently in children pneumonia is ushered in with abdominal symptoms. I have seen cases of acute pneumonia which have been sent up to hospital with the diagnosis of appendicitis or intestinal obstruction, or even peritonitis, without there being any real abdominal affection. When, therefore, pneumonia early becomes complicated with peritoneal infection, there is a considerable probability of the primary lesion not being recognised. Pneumococcic peritonitis has hitherto been much more frequently met with in children than in adults, and in the female sex it is more common than in the male. Where the disease is primary in the peritoneum the path of infection is probably through the alimentary canal. Ghon has reported cases where, in peritonitis secondary to perforation of stomach or gastric carcinoma, the pneumococcus was found, once in pure culture. The pneumococcus does not flourish in an acid medium, but where the natural acid in the stomach is deficient or absent, as in carcinoma, the conditions are more favourable. Where there is gastro-intestinal catarrh the conditions may likewise be more favourable, due, as suggested by Bryant, to the altered condition of the secretions. The constitutional disturbances at the outset of pneumococcic peritonitis are similar to those of pneumonia. Herpes labialis, which is uncommon in other forms of peritonitis, is sometimes met with. I do not think it is likely that infection comes by way of the genital tract, a suggestion put forward to explain the more common incidence in the female sex. According to Bryant, the fluid in pneumococcic peritonitis generally differs from that due to streptococcic infection in being thinner, like pus which has been diluted, and separating into two layers on standing. According to v. Brunn,[1] however, the fluid is usually thick and fibrous, and tends to become encapsulated. In Sir Dyce Duckworth's case it was described as thin, turbid and dark-coloured, and in Dr. Frederick Taylor's as partly clear and partly greenish-white mucoid pus. In one of Dr. Michell Clarke's two cases, however, the pus, which was large in amount, is described as greenish-yellow and fairly thick. In the other it is noted that two quarts of thin greenish-yellow fluid were discharged. The prognosis in pneumococcic peritonitis is better than in most forms of peritonitis.

Otitis, although not infrequently the result of pneumococcic infection, is a very unusual complication of pneumonia; only one doubtful case has been observed in ten years at St. Thomas's. The pneumococcus gave rise to otitis media in 18 out of 1,449 recorded cases.

Pneumococcus meningitis may appear as a primary disease as well as complicating pneumonia. It is usually acute and purulent, and is almost invariably fatal. Death may occur within sixty hours after the first appearance of symptoms. A chronic and sero-fibrinous form of pneumococcus meningitis has also been met with. There were 11 cases recorded among 1,449 at the Boston and Pennsylvania Hospitals.

A case of cerebral abscess occurring six months after acute pneumonia was recorded by Dr. Batten.[2] The patient had been ill for many weeks following the attack of pneumonia, and there was a suspicion of empyema, but no tapping or operation had been performed. The abscess contents were very putrid, and staphylococci as well as pneumococci were present.

I have had no personal experience of localised neuritis after pneumonia, nor have there been any cases under my colleagues at St. Thomas's. Daireaux[3] says paralyses due to this cause usually implicate the arm on the same side as the pneumonia. He describes also a diffuse form of neuritis, diphtheritic in type, occurring several weeks after recovery from the primary disease. There is, first, paresis of the lower limbs, and subsequently the arms are similarly affected. In other cases there is atrophy as well as weakness of the muscles. There is no tenderness in the course of the main nerves, and, except for occasional twinges of pain, no sensory disturbance. Daireaux attributes these cases to anterior poliomyelitis. The same writer has described transitory attacks of hemiplegia occurring in patients suffering from or recovering from pneumonia, which he considers to be the result of some toxic affection of the cells of the motor cortex.

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[1] *Beiträge zur klin. Chirurg.*, Bd. xxxix., 1903, pp. 57-112.

[2] *Brit. Med. Journ.*, 1901, vol. ii., p. 766.

[3] *Arch. Gén. de Méd.*, Sept. 4, 1900.

Arthritis as a complication of pneumonia was recognised long before the discovery of the pneumococcus. Grisolle, in 1864, described four cases of arthritis occurring either during or shortly after an attack of acute pneumonia. He noted that the joint affection was persistent instead of fugitive, as in acute rheumatism, and he concluded that it was quite distinct from the latter. No doubt many cases of the kind have been observed, but until the discovery of the pneumococcus it could not be actually proved that arthritis was anything more than an accidental association. It is to Weichselbaum that the credit belongs of having, in 1888, first established pneumococcic arthritis as a clinical entity, and since then many cases have been described in literature. The most complete accounts are those given by Leroux (1899)[1] and Herrick (1902).[2] With regard to the actual frequency of arthritis as a complication, the statistics show that it is far from common. It is probable that it really occurs more frequently than one would gather from the older statistics, such as those of Vogelius from the clinics of Berlin, Paris and Munich, who found not more than 6 cases among 5,158 cases of pneumonia, and those of Netter, who reported the same number among 4,156 cases in German clinics, only a little over 1 per thousand. Cave[3] was the first in this country (1901) to record an undoubted case of the disease, and since then other cases have been reported here by Raw, Dudgeon and Branson, Secretan and Wrangham, and Nitch, and in America by Howard Slaughter and Witt. Still, it is probable that many cases of arthritis which are really pneumococcic are not recognised as such. When pneumococcic arthritis appears it is usually after the crisis that one or more joints become hot, painful, swollen and tender. The larger joints are those more commonly affected, especially the knees, the hips and shoulders, but any joint may be affected. Redness and œdema are rare. There is some elevation of temperature, but little constitutional disturbance unless other complications are present.

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[1] "Les Arthrites à Pneumocoques," Paris, 1899.

[2] *Amer. Journ. Med. Sci.*, vol. cxxiv., p. 12, 1902.

[3] *Lancet*, 1901, vol. i., p. 82.

Affection of the joints results from a blood infection, and is in most cases accompanied by serious constitutional symptoms. Where the latter are present the prognosis is extremely grave. In some cases, however, the joint affection appears without toxæmic symptoms, and then the outlook is more hopeful. Out of 31 cases of pneumococcic arthritis in children recorded by Nitch,[1] 14 were fatal, or 45 per cent. Out of 63 cases, including all ages, which I have collected from literature, 41 died, or 65 per cent. Periarticular inflammations and abscesses may also be met with. Arthritis is met with at all ages, but a considerable number have been recorded in quite young children. It may occur without being preceded by pneumonia, but following some other form of pneumococcus infection, such as otitis media. The fluid in the joints in different cases may be thin, turbid or sero-purulent, or purulent and of a thick, creamy consistency. The treatment should be surgical, by incision and drainage.

In view of the fact that the pneumococcus is such a frequent denizen of the secretions of the mouth and upper air passages, it is not surprising that it should sometimes infect the mucous membranes and result in a variety of inflammatory conditions, erythematous, follicular, herpetic and suppurative. Cary and Lyon[2] have reported a remarkable case of pneumococcic pseudo-membranous inflammation of the mucous membranes, of which nearly all were affected with a profuse pseudo-membranous exudation. The mucous membrane of the lips, gums, cheeks, under surfaces of tongue, hard and soft palate, fauces, tonsils, pharynx, nose, the glans penis and the anus were covered with a membranous exudate consisting of thick white gelatinous material containing diplococci in almost pure cultures. There was also conjunctivitis, with a flaky exudation, from which the same pure culture was obtained. The passage of membranous shreds and mucus in the stools suggested that the gastro-intestinal tract was also affected.

The occurrence of croupous colitis as a complication of pneumonia was first recorded by Bristowe[3] half a century ago. Osler has recorded cases where thin layers of adherent lymph were observed on the surface of the mucous membrane of the large intestine, and one case in which there was a thick adherent exudation on the mucous membrane of the stomach. Since then there have been reported a number of cases of pneumococcic infection of the mucous membranes of the mouth, tonsils, fauces, pharynx, trachea, nares, conjunctivæ and rectum. Such cases may and do occur independently of pneumonia.

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[1] *Brit. Med. Journ.*, 1907, vol. ii., p. 729.

[2] *Amer. Journ. Med. Sci.*, 1901, vol. cxxii., p. 298.

[3] *Path. Soc. Trans.*, vol. viii., p. 66.

Thrombosis was observed in 20 cases out of a total of 3,066, or once in every 150 cases. It is nearly always the femoral veins which are affected, and the left more commonly than the right. Michell Clarke has reported a case in which there was thrombosis of the veins of the left arm, and another in which there was reason to believe that there was thrombosis of the cerebral vessels. The external jugular and axillary were blocked in a case reported by Ashton and Landis. Of 41 cases collected by Steiner[1] death occurred in nine and there was recovery in twenty-five, while in the remainder the issue was not recorded. Of the twenty cases mentioned above, four were fatal, six recovered, and in ten the issue was not recorded. At St. Thomas's one case out of the nine was fatal. Thrombosis sets in with pain and tenderness in the region of the affected vessel, followed by œdema if the vein be blocked and there is a rise of temperature.

Acute tonsillitis with exudate, severe angina or abscess, may result from a pneumococcic infection, which is perhaps more commonly the cause of these affections than is at present realised. But, as Cary and Lyon have pointed out, unless the pneumococcus is found in pure culture it cannot be accepted as the certain cause of the affections.

It is interesting to note that the pneumococcus has been found by Rochon[2] in pure culture in the contents of herpetic vesicles about the anus. It is possible that the eruption of labial herpes in pneumonia is a local infection with the pneumococcus, and is of the nature of an auto-vaccination. It is considered that the appearance of herpes in pneumonia is a favourable sign, and I am inclined to agree with that view. The favourable issue may possibly be influenced by this auto-vaccination.

Subcutaneous abscesses and cellulitis have resulted from local infection with pneumonia at *post-mortem* examinations.

Conjunctivitis and corneal ulcer and hypo-pyon have long been observed as following pneumonia, especially in children, but I have personally never seen these complications.

Nephritis has been met with as a complication in 12 out of 750 cases at St. Thomas's. Of these, 8 were fatal. Nephritis appears to be a more frequent complication in youth than during other periods of life. Between the ages of 7 and 19 the mortality of pneumonia is very small, only 2·1 per cent., among the St. Thomas's cases, and it is significant that of the fatal cases 6 out of 8 had some kind of kidney complication.

[1] *Johns Hopkins Hospital Bulletin*, June, 1902, p. 130.

[2] *Journ. de clinique et de thérap. enfant*, Paris, 1896, p. 843.

Although the various complications have been considered individually, it must be remembered that often there are a number of these co-existent. The condition is one of pneumococcic bacteriæmia, and we meet with a combination of lesions such as ulcerative endocarditis, arthritis, empyema and meningitis. Such cases are at present, as far as we know, almost always fatal.

With regard to treatment by means of serum and vaccines, I have no personal experience to place before you. In judging of the effect of such treatment it is important to bear in mind the varying mortality of the disease at different ages. The great majority of young subjects recover under the usual methods of treatment, just as a large proportion of elderly subjects die. I must leave it to others to bring forward conclusive evidence that serums and vaccines are efficacious in saving life, especially at those ages at which it is most in peril. As an encouraging indication that vaccine treatment is promising and is deserving of careful and extended trial, I may very briefly refer to a recent report by Dr. A. Boellke[1] on cases treated by him at the Städtisches Krankenhaus at Rixdorf. Fifteen cases in all were treated, of which thirteen were cases of pneumonia of a severe type, one was a case of empyema, and one was a case of pneumococcic endocarditis of malignant type. The cases of pneumonia all recovered except two, which did not come under care until the seventh and eighth days of the disease, when the condition was practically hopeless. Of the eleven cases which recovered, two had one injection, seven had two injections, and two had three, the average dose being 5 c.cm., containing approximately 150 million pneumococci. The opsonic index was in all cases taken before the injection and again twenty hours after. As a rule, the opsonic index was below normal before, and when this was the case it was invariably raised to normal, or above normal, after. In those cases where the index was found to be above normal before treatment, it was either further raised or kept at the same level after. The most striking result, however, was obtained in the case of malignant endocarditis. The opsonic index, at first, was as low as ·01. The first injection caused it to rise to ·53. Five injections in all were given during a period of ten days. After fifteen days the temperature assumed a normal level, and the patient made a good recovery.

Dr. ALEXANDER G. R. FOULERTON: When considering the possibilities of specific bacterial treatment in cases of pneumococcic infection, one may first draw a sharp line of distinction between the treatment of acute lobar pneumonia and the treatment of other less immediately acute manifestations of the infection, whether consecutive to pneumonia or not. For the acute pneumonia, treatment with bacterial vaccine cannot be advised, at any rate at present; in some other conditions the treatment affords good hope of success; a severe case of pneumococcic endocarditis, for instance, has recently been treated with a vaccine prepared from the pneumococcus isolated from the patient's own blood, and with a good result, which appeared to be due unquestionably to the particular treatment adopted. But I take it that the main object of our discussion is rather the treatment of acute lobar pneumonia. And here I think that, when considering specific bacterial treatment, we must again differentiate between the earlier stages of cases of pneumococcic lobar pneumonia, when we have to deal with a pure pneumococcic infection, and the later stages in certain cases, occurring especially, perhaps, in older subjects, which have missed a favourable crisis, and in which the lung, during a prolonged stage of resolution, has become the seat of some secondary infection. The practical difficulties in the way of deciding as to the actual frequency of secondary infections in prolonged lobar pneumonia are considerable, but I think that the investigation of the causation of pleural empyema throws some light upon the subject. I noticed that Dr. Mackenzie said that "the pneumococcus is the cause of empyema in nine cases out of ten." This is not quite in accordance with my own experience. Some six years ago I examined a considerable series of these cases, and found that the relative proportion of cases of pneumococcic empyemata was lower than hitherto it had been believed to be; I found also that there was a marked difference between cases in adults and cases in children with respect to causation. In adults I found that, after excluding a small minority of cases in which pleural suppuration was due to other causes, about 75 per cent. of the cases in my series were streptococcic, and about 25 per cent. pneumococcic. In children, after excluding an almost negligible minority of cases in which other micro-organisms were present, I found that at least 80 per cent of the cases were pneumococcic, and about 20 per cent. of the cases streptococcic ("The Pathology of Pneumococcic Infection," *Lancet*, 1901, vol. ii., p. 472). In all of my cases cultural methods were used for identification of the organisms present, and in nearly all the cases the further test by animal inoculation was employed. The results of the microscopic examination of the sputum in cases of prolonged pneumonia also suggest the comparative frequency of secondary streptococcic infection in these cases; and I think that it is almost certain that in a majority of the cases of prolonged pneumonia we have to deal with a mixed infection, in which possibly the secondary infection may have become the more important factor. And I would suggest that it would be at least worth while to test the effect of a vaccine prepared from the streptococcus in the patient's own sputum in some of those cases in which, especially in older patients, we find a prolonged resolution of the lung after lobar pneumonia associated with the presence of this organism in the sputum. Other cases, occasionally met with, in which this treatment of the secondary infection has been tried, are cases in which a troublesome sinus, discharging streptococcic pus, has remained after the surgical treatment of an empyema. Next, with regard to the treatment of lobar pneumonia in the earlier and acute stage, in which we may be sure we have a pure pneumococcic infection to deal with. Here we have to choose between two methods of treatment—bacterial inoculation carried out with a vaccine prepared from the pneumococcus, and serum treatment. We may either try to hurry on the patient's auto-immunisation by injecting the vaccine, or we may supply the patient temporarily with ready-formed anti-bacterial substances (using the term in its widest sense), hoping in this way to tide him safely over the interval during which the natural processes of auto-immunisation are working in the direction of a natural cure. And I think that most of us would prefer, on theoretical grounds, the serum treatment under the circumstances, on the general principle that in the earlier stages of acute infective processes bacterial vaccination is out of place as a method of treatment. According to Ehrlich's original conception of the process of immunisation generally, a deficiency of the natural anti-bacterial substances in the blood precedes the increase in the possibly more intimately specific anti-bodies which normally results from either naturally acquired infection or from bacterial vaccination; and so, preceding acquired immunity, we have a short stage of lowered resistance to infection, which in recent years has come to be generally recognised under the term of "the negative phase." And so I think that most of us would hesitate before treating a patient on the third or fourth day of an acute pneumonia with an additional dose of the specific poison. Increased empirical experience of the results of bacterial inoculation, and more especially, perhaps, in the treatment of fairly acute pulmonary tuberculosis by tuberculin, has shown some results which are opposed to preconceived ideas as to the advisability of limiting treatment by bacterial vaccination to quite chronic infective cases, but with our present knowledge its use in acute lobar pneumonia must be looked upon as a somewhat dangerous experiment. Then with regard to the other practicable method of specific bacterial treatment, serum treatment, one has to acknowledge failure up to the present time. It is now many years since Klemperer, Foa and Carbone, Janson and others claimed a certain measure of success in the treatment of patients with rather large injections of serum from immunised rabbits. But the cases treated in this way were too few to allow of any reliable conclusions being drawn from the results obtained, and the more general use of the horse anti-pneumococcic serums prepared by Pane, by Washburn and by others, cannot be said to have proved generally successful. More recently Römer's anti-pneumococcic serum appears to have been extensively used in Germany, but not with results which, so far as one can judge, hold out any prospects of better success than has been previously obtained. During 1905 and 1906 a considerable amount of work was carried out in the Middlesex Hospital laboratories on the suggestion and with the advice of Sir Richard Douglas Powell; and whilst our results have not been more successful than those of others we have learned, I think, meanwhile something which will be useful in future work in the same direction. I need refer only in the briefest possible way to the details of our work. We commenced with two horses, one to be immunised against different strains of pneumococci, the other against pneumococci and streptococci. After the animals had been under treatment for several months, we were so unfortunate as to lose both, from accidental causes not directly connected with the bacterial treatment. Meanwhile we had obtained a serum which afforded a certain degree of protection to rabbits against pneumococcic infection. Having lost these two animals, we proceeded to immunise a third mare against a number of strains of pneumococci obtained from various cases; and as a point of interest it may be mentioned that a well-marked paralysis of the extensor muscles of the fore limbs developed during the process of immunisation. The serum obtained was tested therapeutically in a number of cases of pneumonia; and, after excluding sundry doubtful cases, I can select from my notes a series of seven cases of typical acute lobar pneumonia in which the serum was used early, and which may be relied upon as fair test cases. The results were distinctly disappointing. I find that in one very severe case, treated on the third day, the effect of the serum was unmistakable, and the result favourable. In another case the immediate effect of repeated doses of the serum was also marked; but, after an apparently favourable crisis, the patient's temperature again rose and death occurred some weeks later from a rather unusual complication, peritonitis following on a pneumococcic abscess of the ovary. In both these cases, so far as one could judge clinically, the action of the serum was at any rate partly anti-toxic. In the remaining five test cases it was impossible to say that the serum had the least effect one way or the other; one of the cases died, the other four recovered, but it was not possible to say that the serum had influenced the results. On carrying out a series of tests to determine the value of the horse serum in what may be generally termed specific anti-bodies, and using for this purpose the agglutination test, the test of animal inoculation, and the estimation of the opsonic index of the serum, I found that, while the horse reacted readily enough to bacterial vaccination by the formation of specific anti-bodies, the subsequent period during which evidence of the presence of these bodies in the serum could be obtained was very limited. Thus on testing the serum in November, 1906, when, after a prolonged period of vaccination, all treatment of the horse had been dropped for six weeks, it was found that the serum had lost all protective action for rabbits, that it did not cause any agglutinative reaction with cultures of micrococcus pneumoniæ, and that its opsonic index was only ·6 as compared with that of two normal horses. On November 12 a full dose of pneumococcic vaccine was given, and the serum was drawn off and examined on November 14, when a good agglutinative reaction was obtained with a 1:25 dilution of the serum, and the opsonic index had risen to ·75. On November 21 another full dose of pneumococcic vaccine was given, and the serum was tested again on November 23. On the latter date a strong agglutinative reaction was obtained with a serum dilution of 1:100, but owing to accidental causes the estimation of the opsonic index was not satisfactorily carried out. On November 28 the serum gave a distinct agglutinative reaction with a dilution of 1:500, and an immediate and macroscopically obvious reaction with a dilution of 1:100, and the opsonic index was 1·5. On December 5 the agglutinative reaction was very active, so active in fact that it was found impracticable to arrive at an estimation of the opsonic index because of the immediate formation of huge clumps of the cocci as soon as the serum was added to the bacterial emulsion; and at the same time the serum had a distinct protective action for rabbits. Five weeks later no evidence of the presence of specific anti-bodies in the serum could be obtained by any of the tests used. This apparently short duration of immunity in the horse after vaccination treatment—it should have been mentioned that the process of immunisation was carried out with bacterial vaccines, filtered broth-cultures of pneumococci, and sterilised peritoneal exudation from rabbits which had died with pneumococcic infection—is in accordance with what is known as to the apparently short immunity from the infection which follows an attack of pneumonia. In clinical work the fact that one attack of pneumonia does not confer any appreciable degree of immunity against a second attack has been long recognised. And MacDonald, in an investigation into the opsonic content of the blood-serum in cases of acute pneumonia (*Transactions of the Pathological Society of London*, 1906), has shown that the index rises considerably at the time of, or just before, the occurrence of the crisis, but falls to normal within a few days. That acquired immunity in the rabbit is also of short duration was suggested by certain experiences in the course of our work at the Middlesex Hospital. Thus in one or two instances rabbits, after having been successfully protected by immune horse serum against moderately heavy doses of virulent pneumococcic blood from infected rabbits, and having thereby acquired, as one would think, a certain degree of immunity, were found to be as susceptible to fresh infection within three weeks as unprotected rabbits. Somewhat similar experiences by Metschnikoff (*Ann. de l'Institut Pasteur*, 1893) and by Auld (*Transactions of the Pathological Society of London*, 1901) have been interpreted as signifying an even increased susceptibility in rabbits after treatment with the view of immunisation ; but I do not think that our own somewhat limited experience goes further than to suggest a rapid loss of immunity with a return to normal susceptibility. And whilst I believe that the preparation of such a therapeutic serum is within the range of possibility, it would appear that in preparing an anti-pneumococcic serum one has to pursue a somewhat difficult course between over-immunisation, on the one hand, and failure to maintain an efficient anti-bacterial value on the other. This difficulty is not peculiar, of course, in the preparation of an anti-pneumococcic serum, only it is probably much greater than in the case of some other serums. And, in conclusion, I believe that the comparative failure which has marked the use of anti-pneumococcic serum in practice has been due to ineffective methods of preparation of the serum itself rather than to any fallacy underlying the application of this method of treatment in acute pneumonia.

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[1] *Deutsch. Med. Wochensch.*, Bd. xxxiii., 1907, p. 1,487

Dr. HERRINGHAM said his task was simply to give a few words of explanation about the tables of statistics which Dr. Langdon Brown, the Registrar of St. Bartholomew's Hospital, had sent in. There were two tables, one of which gave the mortality of the disease, and the other that of the complications. The two tables were not drawn from exactly the same series of cases. When one was asked for the death-rate from pneumonia, it was easy to give it; he had only to take those cases in which pneumonia was the substantive disease, those in which it would be given as the primary cause of death on the certificate. But when Dr. Brown was asked for the complications of pneumonia, he felt—and Dr. Herringham agreed with him in that—that he was not at liberty to refuse to include in his statistics any case in which the physician during the life of the patient, or the pathologist after death, had put down pneumonia on the headings of the case. Therefore it included a large number of cases in which pneumonia was the terminal infection of, perhaps, a long disease. For instance, in a case of gastric cancer it was found after death that there was grey hepatisation of the left lobe of the lung, and a portion of it was gangrenous. And many cases of chronic heart disease died in that way. That kind of case was included in the table of mortality. Possibly many of those cases were pneumococcal in origin. At the same time, if a person writing on pneumonia were to refer to these statistics and say that was the percentage of complications, he would probably be misled. Moreover, the table not only included those cases in which pneumonia, for the most part apyrexial, occurred as a terminal infection of a chronic disease, but also included cases in which the original disease was a general pneumococcic infection, and in which the acute lobar pneumonia would occur, not as the substantive or primary disease, but as a comparative accident in the course of general pneumococcic infection. Therefore, in both those ways, the table of complications required revision if applied to illustrate acute lobar pneumonia as the substantive disease, and if necessary Dr. Brown would be glad to alter it in that sense. With regard to the sequelæ of pneumonia as a substantive disease, he would first refer to local complications in the lungs. He would not refer to pleurisy and empyema. In the statistics there were four cases of gangrene and four cases of abscess of the lung. But none of those cases of abscess would truly be called such; none of them were encapsuled: they were cases of sloughing areas of solid lung, due to the virulence of the infection, without any delimiting line between that and the rest of the pneumonic lung. It was in the nature of mankind at one time to call a condition abscess, and at another gangrene. With regard to those cases which were called chronic pneumonia, cirrhosis of the lung, and bronchiectasis, he had been over several of them, and he could not find a single case—with one exception, and that occurred under Dr. Gee many years ago—

in which there was the slightest doubt that the bronchiectasis, the contraction, and the cirrhosis formed a preceding condition. In that one exception the pneumonia was the preceding condition. St. Bartholomew's had a large percentage of endocarditis; but that was due to the fact that some of the St. Bartholomew's cases were acute pneumonia supervening on those general pneumococcic infections which were attended with ordinary ulcerative endocarditis and septicæmia. One of the cases was not even pneumococcal. It occurred in the practice of Dr. Tooth, the man being admitted for gonorrhœal septic endocarditis, gonococci being found in the blood, after which the man got acute pneumonia. Of pericarditis he need only say he had been astonished how very few cases found after death to have pericarditis were so recognised during life. That made him suspect that pericarditis was a much more common sequel of pneumonia than was at present believed. If so, it would mean that it was not nearly so fatal a complication as was supposed. With regard to meningitis, six cases were discovered *post mortem*, and only one of those gave any symptom during life, other than a somewhat drowsy delirium, such as was commonly found in pneumonia. The case which gave other symptoms than that showed rigidity of the right arm, strabismus, and so on, obviously pointing to meningitis or some similar affection. That raised the question as to whether all cases of pneumonic meningitis were fatal. Were not some of the cases of severe delirium in pneumonia, which recovered, cases of slight meningitis, or encephalitis, due to the pneumococcic infection? He was not aware that anybody had tried to settle that point, and he had wondered whether anybody had looked at a series of optic discs in the course of acute pneumonia. With regard to the complication of acute nephritis, having followed up many of the cases given under that heading, he could say that he had not found one in which the acute nephritis led to a condition that lasted after the discharge of the patient. Several of the cases were noted as having albuminuria when they came in, and with a history of having had albuminuria at previous times. Several of the cases got a fairly acute nephritis, but it did not last. Of phlebitis there had been at the hospital a few cases of the usual type, affecting the legs only. A further point concerned the supervention of pneumonia in the course of other acute diseases. There had been two cases in which pneumonia occurred during typhoid fever, when the fever of the typhoid had subsided. In a third case there were signs of pneumonia very distinctly on one side of the chest, but the fever was masked by the fact that the typhoid was, at that time, at the height of its course. There had been two cases in which rheumatism was added on the chart. Both occurred in his own wards. Only the other day he had another case of the kind. A boy was admitted for rheumatism and severe heart disease. He had an attack of high fever, dyspnœa and cyanosis, with consolidation of his right apex. It was not at all a typical pneumonia. One patient was a man, aged 28, who was admitted for rheumatic fever, multiple arthritis, and purpura. The heart was natural, and the rheumatism cleared up under salicylate of soda. On the next day there was pneumonia at one base, and, later, of the other base also. The fever fell by lysis in sixteen days. The next case was that of a woman, aged 31, who was admitted with rheumatism and double mitral disease. Thrombosis of the left leg followed. A fortnight afterwards the left jugular vein was affected. There were dulness and bronchial breathing at both bases. Thrombosis of the other leg followed. Lastly, there were two cases of lupus erythematosus, in which the pneumonia occurred as the subsequent infection. One case was under Dr. Ormerod, but the clinical notes remained only in headings. The patient was a woman, aged 24, in whom pneumonia succeeded lupus erythematosus, followed by septicæmia, peritonitis, pericarditis, and death. The other case was in the speaker's own wards in the present year, and was treated by Dr. Drysdale. She was ill for many months with lupus erythematosus, from which she recovered in the usual desperate condition—the loss of all her hair, little scar-pits over her hands, and great wasting. She retired to her home. Within two months she was re-admitted, this time with pneumococcal peritonitis, for which she was operated upon, and did well. A fortnight afterwards she got a large pericardial effusion and pneumonia, which he was called to see in the surgeon's ward. The pericardium was opened and drained, but after a slight rally the patient died. Seeing that lupus erythematosus was a rare disease, he thought that those two cases, both of them subsequently infected with the pneumococcus, were worth mentioning.

Dr. PASTEUR: It would be impossible, within the time allotted to each speaker, for me to deal fully with all the data furnished me by the kindness of Dr. Williamson, our medical registrar, and of my house physician, Mr. Apperly. I shall, therefore, content myself with a brief reference to the pneumonia statistics of the Middlesex Hospital, and then deal somewhat more fully with the cases of acute dilatation of the stomach and of gangrene of the lung. Of 582 cases treated during the period under review, 142 died, giving a case-mortality of 24·3 per cent. The exclusion of cases under 10, the decade during which the mortality from lobar pneumonia is at its lowest, makes it hazardous to compare these figures with other records, which generally comprise cases at all ages, but it may, I think, be assumed that the figures presented to-day will show a somewhat higher general mortality-rate than would have been the case had all ages been considered. The mortality for the second decade was 5·2 per cent., for the third 14·2 per cent., for the fourth 34·3 per cent., for the fifth 39·3 per cent., for the sixth 46·6 per cent., and over 60, 68·6 per cent. Complications were met with in 72 cases, 15·5 per cent. Of these, 39 died and 33 recovered. Among the more frequent complications the most fatal were: pericarditis (13 deaths in 17 cases) and gangrene of the lung (5 deaths in 7 cases). There were 28 cases of empyema, of which 21 recovered. With three or four exceptions the signs of pericarditis (friction) were recognised during life. Effusion was generally slight, never large in amount. Acute dilatation of the stomach occurred twice, and was in each case the immediate precursor of death. The first case was that of a very stout married woman of 24, admitted to hospital on the second day of an acute attack of pneumonia of the right lower lobe. On the fourth day after admission there was frequent vomiting of brownish fluid, without effort. At this time the stomach was not obviously dilated. Twelve hours before death, which took place on the following day, dilatation of the stomach was recognised, giving rise to marked bulging behind and below the left ribs. It was accompanied by extreme dyspnœa and increasing cyanosis, with irregularity of breathing and of heart action. At the *post-mortem* examination the U-shaped dilated stomach occupied nearly the whole of the abdominal cavity, reaching to the pubes. It contained 35 ounces of dark greenish fluid, and on being relieved of its contents rapidly shrank to little more than its normal size. The second case was that of a poorly nourished woman, aged 36, admitted with pneumonia of the left lower lobe. She died within twenty-four hours of admission. Symptoms of acute dyspnœa and rapidly increasing cyanosis, attributed to heart failure, supervened four hours before death, with irregularity of pulse and respiration. *Post mortem* there was found an enormous U-shaped dilatation of the stomach and first part of the duodenum. I have met with a third example of this complication in private with symptoms very similar to those just described. In this case the dilatation of the stomach was very obvious. In a series of forty-four cases of acute dilatation, analysed by Campbell Thomson, there was associated pneumonia in three cases, including the first case just referred to. We may, therefore, conclude that this complication is not of extreme rarity. The treatment of the condition has so far been very disappointing, even in cases not complicated by a serious constitutional disorder. The presence of pneumonia, in my opinion, negatives the resort to heroic measures, such as laparotomy for the relief of suspected pressure on the duodenum, or kinks at the pylorus. The best hope of success, in such cases, would seem to lie in an early recognition of the trouble, before the dilatation has proceeded far. The occurrence of vomiting, or an unexpected aggravation of the dyspnœa, should direct immediate attention to the stomach, and on the least indication of dilatation its contents should be emptied by means of a soft tube, all fluids by the mouth withheld, and rectal injections of normal saline solution or plain boiled water with brandy substituted. Failing a tube, the emptying of the stomach, in cases with excessive secretion, may be facilitated by rolling the patient into the prone position, as in a case reported by Mayo Robson and Moynihan, while strychnine in full doses should be given hypodermically to counteract the tendency to collapse. There were among our cases seven instances of gangrene of the lung, six men and one woman. With two exceptions the patients were over 40. There was a clear history of alcoholism in four, and a presumption of it in another. In two of the cases alcohol was not a factor. Only two of these patients recovered, and one of them died a year after from purulent meningitis following on bronchiectasis. As the effects of this complication are so uniformly unfavourable, I propose to say a few words about the two patients who recovered. An old soldier of plethoric habit, with definite alcoholic history, was admitted in January, 1901, with pneumonia of the right base. (The notes referring to this period have unfortunately been lost.) He was sent to the convalescent home in April, coughing up daily about 3 ounces of fœtid muco-pus. Whilst at the home he had several attacks of severe hæmoptysis. When re-admitted to hospital in July of the same year there was distinct clubbing of the fingers. He was anæmic from recent severe hæmoptysis. There were definite signs of a cavity of considerable size at the right base. The cavity was freely opened up and drained at the end of July by Mr. Pearce Gould. Early in October the patient was discharged convalescent, the wound having completely healed and all signs of gangrene disappeared. He remained in fair health until May of the following year, when the sputa again became slightly offensive and he had a moderate hæmoptysis. Five days after admission he had a severe rigor, followed next day by the expectoration of some very offensive muco-pus. A week later cerebral symptoms set in, with frequent vomiting, death taking place at the end of three days. There was general purulent meningitis, and a small abscess in the left occipital lobe. The right lung was very adherent and partially collapsed, and there was considerable dilatation of the extremities of some of the bronchi. No gangrene was present, nor could any trace be discovered of the gangrenous cavity laid open the previous year. The interpretation of the clinical features of this case is admittedly complicated by the co-existence of bronchiectasis, which was the determining cause of the meningitis, but I think it may fairly be claimed as a surgical success in the treatment of a gangrenous cavity of the lung. Bronchiectasis was not present previous to the original attack of pneumonia. The striking clinical feature of the case was undoubtedly the repeated severe hæmorrhages. The last case I shall refer to is that of a heavily built, pasty-faced, alcoholic individual of 41, who was suddenly seized with general epileptiform convulsions and admitted to hospital in a state of semi-coma on September 8th. General convulsions recurred at intervals during the first twelve hours. As he became more fully conscious on the fourth day he complained of acute pain in the right side, and on the following day there were definite signs of pneumonia of the right base. On the ninth day there was gangrenous fœtor of the sputum. There were numerous crepitations and bubbling sounds over the right lower lobe, but no cavity signs. He improved gradually till October 5th, when the temperature rose suddenly to 103 and he coughed up a considerable quantity of fœtid muco-pus. After this, fœtor rapidly subsided. On the 11th he had a similar attack, with suffocative cough, which all but proved fatal, and for two or three days he brought up large quantities of fœtid muco-pus. After this improvement was continuous, and before many days he ceased to expectorate. No cavity signs were discovered at any time, but the breathing remained permanently weak at the right base. Towards the end of November he underwent a severe operation for an unreduced dislocation of the left shoulder, and left the hospital in perfect health at the end of December. In the June following, eight months after the attack of gangrene, he was still in perfect health and able to do his work as a gardener. This is a good instance of spontaneous cure of a pulmonary gangrene, and I may add, without exaggeration, that it would be difficult to conceive a case more unpromising at the outset. A generally stimulating line of treatment was adopted in both cases, with inhalation every two or three hours of a mixture containing equal parts of pure carbolic acid, chloroform and eucalyptol.

Dr. Hadley proposed the adjournment of the debate, which was agreed to.

The President, therefore, adjourned the discussion to Tuesday, November 5, at 5 o'clock.

Medical Section.

November 5, 1907.

Dr. Gee, President of the Section, in the Chair.

Pneumonia and its Complications.

A Discussion—*continued.*

Dr. Hadley, in reopening the debate, said his first duty was to thank the Registrars at the London Hospital for so untiringly taking out the numbers, which was an enormous work, and occupied two or three months. There were some 2,362 cases in the last ten years, and it must be remembered that none of those presented in the statistics were under 10 years of age. For that reason the figures differed very much from what they would have been if the whole hospital population had been taken. There were several points of interest. The figures were collected from the working classes, and differed very much from some which he had relating to the well-to-do. First, it was noticeable that the disease was three times commoner among men than among women, a fact which he did not see mentioned anywhere, but which he thought the collected figures from all the hospitals tended to show. That difference held not only in the one-age group, but in all the groups from 10 to 40 and over. It was not true in the group returned from the Children's Hospital, and he felt that it must be due to a certain extent to the extra exposure of the working classes among the male sex. The mortality increased with age, and as patients under 10 were excluded, one missed the great mortality among those of tender age. He had divided the age-groups into :—

10 to 20.
20 to 30.
30 to 40.
40 onwards.

The smallest mortality was in the youngest age-group, 10 to 20 The mortality in this group amounted to only about 5 per cent., whereas in the older cases it was nearly 50 per cent. That was largely due to the fact that the complications were much more numerous in older people. Another interesting point was that, although the cases were much less frequent in females than in males, the mortality was greater in females; and that was borne out in most of the collected cases—it certainly was so in those which came from the London Hospital. It was necessary to remember that of the complications those were most important which meant antecedent conditions. They were often lumped together with the remark that cases were complicated by heart disease, forgetting that although that was a complication and made the mortality greater, it was not a complication necessarily caused by the pneumonia. In collecting these cases they had been separated into those which were complicated by antecedent conditions and those which were complicated by actual troubles occurring as the result of the pneumonia itself. It was interesting to see that many of the complicated cases were those of antecedent conditions. And it was important to remember how much more fatal pneumonia was in people who had had some antecedent illness. Alcohol came out very strongly. The death-rate in all the cases was 23 per cent., and in taking the alcoholic cases separately the mortality was 66 per cent. He had separated also antecedent cardio-vascular changes, including aneurism, from those which occurred in the course of pneumonia or after it. Antecedent trouble of that kind raised the mortality to 46 per cent. But the largest death-rate of any antecedent trouble, outweighing almost anything which occurred as the result of pneumonia, was chronic nephritis, showing a death-rate of 82·6 per cent. Chronic pulmonary troubles did not play a very important part in raising the mortality. Chronic bronchitis, emphysema, phthisis, or old fibroid lung only raised the mortality from 23 per cent. to 31½ per cent. Therefore it was obvious that, when speaking of complications, it was well to remember that antecedent conditions were more important than those occurring as the result of the pneumonia itself.

Turning to those complications which occurred as the result of pneumonia, empyema, delirium, and pericarditis were the most important, because the most numerous. Gangrene, abscess, and endo- and peri-carditis were the most fatal. Some of them were interesting, but he would not refer to them in detail. As a result of his experience it was difficult to diagnose pericarditis occurring in the course of pneumonia. The post-mortem room was the most certain place in which to diagnose it, and the most usual. It must be carefully watched for, because most people would agree that there was not much chance of a case recovering unless frankly diagnosed and opened up. The very few cases which he had seen recover had nearly all been opened up and drained, or at all events tapped. The effusion was a very large one. Another point on which he laid stress was that, especially in children, the enlargement of the pericardial effusion was directly backwards, or almost so, and it would give rise to dulness at the left base, very much simulating pleural effusion, and not showing much in front. Still, if there were marked dulness at the back, which might or might not be a "pulsating pleurisy," it would arouse suspicion, and then perhaps the observer would be able to appreciate the covered heart, the shifted apex, and the muffled sounds (indicating pericarditis and effusion) in front. But when the patients were too ill to examine very thoroughly the diagnosis of pericarditis would always be difficult. With regard to abscess, he felt that a great many of the cases of so-called abscess of the lung which recovered were not that condition at all. He had seen, once or twice, an interlobar empyema, which burst into the bronchus and was coughed up, diagnosed as abscess of the lung. We believed that abscess of the lung (which must be localised gangrene) was very fatal. One sometimes saw cases with something of the following history: pneumonia running the ordinary course, a crisis, but the temperature showing a tendency to become irregular again, and then becoming of the hectic type. The patient did not get on, the signs remained, cough came on more markedly, and in a fit of coughing a good deal of pus would be brought up, and then the patient would get well. As the amount of pus was not very large, the inference was that it could not be empyema, but in many interlobar empyemata the quantity of pus was not great. From their position in the lung, between the lobes, they naturally impinged on the bronchus, often perforated that part, and were coughed up. Therefore one should regard with some suspicion cases diagnosed as abscess. In the London Hospital collection there were eight cases of so-called abscess, of which several got well. If they had been really abscess he did not think so many would have got well. With regard to meningitis, the symptoms of that were so constantly seen as the result of toxæmia that one must be on one's guard when seeing the symptoms of meningitis in pneumonia. He had seen retraction of the head, headache, vomiting, irregularity of pupils, squint, fits, twitchings; he had also seen mastoids explored, with negative results. Still, when meningitis appeared on the notes, one felt bound to put it down. Then there was the question of peritonitis and colitis: abdominal pneumonia was a condition which must be recognised. Fellows were familiar with cases of appendicitis which were admitted into the hospital on the surgical side, and either had their appendices removed or did not, but who eventually came over to the medical side with pneumonia. There were also cases in which there had been acute peritonitis, in which the abdomen was opened and searched, but nothing found except fluid, and which, having been sewn up and passed over to the medical side, had developed pneumonia a day or two after the operation. Perhaps they had read accounts of pneumonia occurring in an epidemic form in an institution where all the cases could be watched, and in such, one type would show enteric symptoms and another pulmonary symptoms. He had seen that in a village in the country, where the practitioner remarked that half the cases were pneumonia and the others typhoid. He went through the village with the practitioner, and in one house there would be one case with acute tonsillar trouble and bronchial catarrh and another case with symptoms of typhoid, and perhaps a third case with typical pneumonia. Therefore, an abdominal type of pneumonia must be recognised. In the cases given in the statistics he could not bring it out, because these were figures relating to various doctors during the last ten years, but it should suggest itself when seeing colitis or peritonitis and other complications of pneumonia. That led him to speak of abdominal distension, which was referred to by a previous speaker. It was pointed out that in some cases it was due to paralytic (probably toxic) distension of the stomach. One had seen that in other cases than pneumonia, but the point he wished to emphasise was that it was not always of the stomach, nor were the fatal cases always of the stomach, but that the intestines were similarly affected with toxic paralysis, which gave rise to great distension, and it was a very bad sign, *i.e.*, the diaphragm was so pushed up that the patient got heart failure very quickly. He had passed long tubes from the point of view of treatment, and he had left a long tube in the descending colon sometimes, and the patients passed flatus fairly readily, with a corresponding diminution in the size of the abdomen. But abdominal distension was a very bad sign, and he believed it was as often due to distension of the colon as to distension of the stomach. Most of the cases in which arthritis occurred were young cases, many of which were naturally not included in the present series. With regard to fibroid trouble, most of those cases came under the heading of antecedent conditions. It was not common to find fibroid conditions as the result of lobar pneumonia, most of the fibroid cases being the result of broncho-pneumonia following measles or whooping-cough, or both, in early childhood. But where it did occur, apical pneumonia was the commonest not to resolve, and in nearly all of them there was a strong alcoholic history.

Lastly, with regard to inoculation he could say very little, because much had not been done at the London Hospital. But he gathered from others that there were great difficulties in many ways. Firstly, the cultures did not live, and secondly, the acuteness of the disease made it difficult to get the cases early enough in hospital. The crisis often occurred on the second day after admission, and it would be impossible to get a vaccine ready in that time from the patient himself. Even if that were done, there would be a tendency to say the crisis was due to the injection rather than to natural causes. The cases which were more debatable would be the chronic ones, or those in which there was some more chronic manifestation as the result of pneumonia, such as arthritis, empyema, or non-resolution. But in those cases they had not used the injection in any large number of cases. In one case at Victoria Park there was an empyema of some four weeks standing, which would not heal. It was drained in the ordinary way, and Dr. Ross, who was working with Sir A. Wright, came on the scene, and in his enthusiasm made a culture and vaccine and injected it into the patient. The sequel was that the condition healed in about four days; at least, the discharge ceased and the patient went out well. He would think that the cases of arthritis would be very amenable to such treatment. Empyema seemed doubtful, because in the majority of cases in which healing did not occur it was probably due to a double infection. In non-resolution, although the resolution might be helped by the injection, it was very difficult to exclude the likelihood of double infection, and so of getting no effect at all from the injection of pneumococcic serum. He always felt, too, that pneumonia, rheumatism, and tubercle might be placed into a group as diseases which predisposed to a second attack, rather than conferred immunity. Therefore, in speaking of preventive inoculation, one had to remember that whatever immunity could be conferred must be of very short duration. He did not think any insurance company would look upon a person as being safer from phthisis because he had been tubercular. It was necessary to move slowly in regard to that group of diseases in which the first attack seemed to predispose to further attacks rather than to confer immunity.

Dr. DALTON said that, in looking through the statistics which were prepared by the Registrars at King's College Hospital for the purposes of that debate, he noted that it was stated that certain cases ended by lysis, and he thought it would be worth while to look through the notes of those cases. There were 196 cases which recovered, and he excluded those in which there were obvious and gross complications, which would, of course, alter the chart. There were 11 cases remaining, in which the temperature fell by lysis, and it was those cases which he looked at. On investigation he found that in 9 of them, although the signs and symptoms were ordinary and typical, the temperature all through was remittent. So that, in respect to the fever, these were not typical cases, and it was not surprising that defervescence should occur by lysis. He had no doubt that the remittent fever indicated some latent complication or some secondary infection, which interfered with the ordinary course of the pneumonia. There were two cases left over, and in those even the temperature was typical, but the defervescence was by lysis. One of those cases he could not explain in any way, but the other was under his own care, and showed that in it one was not dealing with true lysis. It was in every way typical, with consolidation at the right base. On the fifth evening, May 16, the temperature began to fall and took thirty-six hours in reaching the normal. It then rose again to 100·6° F., and the rise was accompanied by some collapse, with a fresh cough and fresh bringing up of blood. Then some physical signs were found in the left lung. Therefore it seemed that in that case there was no true lysis, but a true relapse, *i.e.*, a fresh attack of pneumonia affecting the other lung. Thus there remained only one case in which the temperature really seemed to come down by lysis. With regard to dilatation of the stomach, he thought it was very common in pneumonia. That point had been raised by Dr. Pasteur. But the distressing condition of those patients prevented one from investigating that point. In influenza he thought that very great dilatation of the stomach was apt to be present in certain cases in which the influenza affected the alimentary canal.

Dr. GOSSAGE desired to make a correction with regard to the cases which were collected at Westminster Hospital. In aggregating the cases he was rather more interested in the fact of the complications than in the proportion which they bore to the total number of cases of pneumonia, and he had included in the complications cases which had arisen as a result of attacks of pneumonia gone through outside, and not only from the cases admitted as pneumonia into the hospital. He had subsequently looked through the cases of empyema after pneumonia again and found that, instead of 28, the number should be 16. Out of that number, 12 died. A very large number of the empyemata were first diagnosed in the post-mortem room.

The point which he particularly wished to make concerned the complications in children, and he thought it was a pity that the statistics were limited to patients over 10 years of age. Lobar pneumonia was as common, or commoner, under the age of 10 as over that age. Out of 577 cases at Westminster Hospital, 246 were under the age of ten; and 246 was really below the proper number, because in one or two years he found that the Registrars had practically included all cases under the age of 3 or 4 as broncho-pneumonia, regardless of the clinical aspect of the case. So lobar pneumonia was at any rate as common—probably much commoner—in children under 10 years of age as in later life. It must be recognised that the diagnosis of lobar pneumonia was a very much less certain matter in children than in adults. There was the difficulty of distinction from broncho-pneumonia, and physicians differed very much in what they regarded as the clinical manifestations of lobar and broncho-pneumonia. And even when one had a definite idea as to what those two diseases were, there were a large number of cases which it was impossible to distinguish, and frequently, in cases which clinically seemed clear, the diagnosis was found to have been wrong when they came to the post-mortem room. Quite apart from that, however, it was obvious that lobar pneumonia was very frequent in childhood.

With regard to the complications of lobar pneumonia, those due to pneumococcic infection of other parts were much more important in children than in adults. The easiest way to show that was to take one particular complication, and he had taken empyema because it was the commonest complication. Empyemata were open to the objection, in his statistics, that they were collected not only from cases which started in the hospital but from those which commenced outside, but in a relative comparison of different ages this did not matter. The proportion of empyemata to the total cases of pneumonia at each age came out very nearly equal, being slightly more frequent in children than in adults. But it must be remembered that there were a large number of cases of empyema which proved to be pneumococcic but in which one could not obtain a previous history of pneumonia, and these were much commoner in children than in adults. No doubt a considerable number of these cases of empyema had had pneumonia beforehand. So the proportion of cases of empyema in children was rather higher than the statistics brought out at first sight. Still, the proportion was not much higher in children than in adults. Yet the death-rate from pneumococcic complications in children, compared to the total death-rate from pneumonia, was very much higher than in adults. In fact, death from pneumonia between the ages of 2 and 10, provided the child was healthy beforehand, was almost invariably due to one of these complications. He had worked it out in regard to the cases under 10 at Westminster and Shadwell, and out of 986 cases of lobar pneumonia there were 95 deaths between the ages of 1 and 10; and of those 95, 16 when they were attacked with lobar pneumonia were suffering from some other complaint, death being due to the fact that their resistance was lessened. Eliminating these, there remained 79 cases of what might be termed healthy children when they were attacked—though East End children perhaps did not warrant that term as a whole. Of those 79 deaths, 51 were due to some pneumococcic complication. For instance, there were 41 cases of empyema, 8 cases of meningitis apart from empyema, 1 case of purulent pericarditis apart from empyema, and 1 case of pneumococcic clear serous effusion. That meant that 65 per cent. of the deaths occurring between the ages of 1 and 10 years of age were due to some other pneumococcic infection. Under the age of 2 there were other factors in producing death from pneumonia. First, there was the factor alluded to by Dr. Mackenzie, namely, toxæmia. A very young patient suffering from pneumonia might be killed directly by toxæmia, and in the statistics furnished from Shadwell there was a considerable death-rate under 1 year of age. Almost the most important factor in producing a larger death-rate in early years was the fact that lobar pneumonia tended then to be complicated by broncho-pneumonia. A large number of cases of broncho-pneumonia were due to the same specific micro-organism as lobar pneumonia, and the complications of both were much the same, so that it was perhaps not surprising that secondary infection with broncho-pneumonia was common in cases of lobar pneumonia.

The statistics also showed a very large number of apparently primary pneumococcic empyemata. Probably some of them had had pneumonia beforehand. But there were a large number of them, and the history was fairly clear in many, allowing for the poor intelligence of many parents, that there had been no sign of lobar pneumonia before the development of the empyema. That would make the pleura one of the commonest seats of selection for the primary infection of the pneumococcus, second only to the lungs and middle ears. It was known that the pneumococcus could primarily affect the pleura, just as it did the peritoneum or the meninges, as there was a particularly acute type of infection of pleura which generally was rapidly fatal. But the cases referred to were usually cases which had had empyema for a long time, and had come into hospital for operation. The death-rate in these was not higher than, if as high as, that in cases of empyema occurring after pneumonia. It was a debatable point, too, whether empyema after pneumonia was not rather due to infection through the blood than by direct extension from the inflamed lung.

Another point was that the pneumococcus did not necessarily bring about a purulent condition. One found that a certain number of cases with clear serous effusion into the pleura were due to the pneumococcus, and which yet did not become purulent. One or two cases of that kind had occurred at Shadwell. There was also one case which did subsequently become purulent. This was of some importance with regard to the possibility of there being pneumococcic meningitis, which did not kill. Dr. Hadley had pointed out how frequently there might be symptoms of meningitis in pneumonia. It was common experience that most of such cases cleared up, never having had meningitis at all, while some of them had had otitis media. But in one case at Shadwell the child had had head retractation, twitching, and optic neuritis, and yet the patient recovered. This strongly suggested a meningeal inflammation and the proved possibility of a pneumococcic clear pleural effusion clearing up rendered it not improbable that the same thing might occur in the meninges, although, of course, such cases would be extremely rare.

Dr. Arthur Latham said the statistics at St. George's Hospital showed the importance of the part played by exposure in the induction of pneumonia. Of 634 patients over 10 years of age, who had been observed during the last 10 years, 526 were males and 108 females. In other words, 83 per cent. were males and only 17 per cent. females. He thought the probability was that exposure was very much more constant in the case of males, and that it was reasonable to believe that exposure played a predominating part in the difference in the incidence of the disease in the sexes. That was borne out by the fact that in the curve of incidence of pneumonia in women the greatest incidence occurred at the age of 25, *i.e.*, at the age at which one would expect exposure to be greatest. In looking also at the monthly curve of incidence of pneumonia (p. 68) during those ten years it was seen that the maximum was in the month of May. After the end of May the curve fell and did not rise again to a submaximum until towards the end of October. Those were the seasons of the year when people were apt to change their clothes too soon in the one case and too late in the other. In this connection he was interested to hear from Dr. Robinson that the hospital at Bulawayo was practically empty during the year except at two seasons, viz., at the height of the rainy season, when it was full of cases of malaria, and again at the height of the cold season, when it was full of cases of pneumonia.

With regard to complications, he had little to say which had not been already said. It had been reported by some observers that in the great majority of cases of pneumonia the knee-jerk was absent. Observation had been made at St. George's Hospital in 125 cases, and in 90 of those the knee-jerk was active throughout the disease, while in the other 35 it was sluggish or absent. Another interesting fact, though perhaps not quite pertinent to the discussion, had been brought out by the observations of Dr. Golla, viz., that the nasal respirations and the thoracic respirations did not show precisely the same curve, *i.e.*, there was a nasal respiration curve which was to some extent distinct from and independent of the thoracic curve. The same was true of the abdominal respiration curve. Anti-pneumococcic serum had been used in four cases with a mortality of *nil*. One of those cases was sufficiently interesting, he thought, to bring before the Section. It was that of a man, aged 21, who was admitted with consolidation of the lower left lobe. On the seventh day the temperature fell from 103° F. to subnormal. The case was under his care, and he thought this fall represented the crisis. On the following evening the temperature again rose, this time to 102·8° F., and there were then definite signs of consolidation at the base of the other lung. There had been no evidence of the other lung being involved before. Twenty cc. of anti-pneumococcic serum, obtained from the Lister Institute, were given, and in twenty-four hours the temperature was normal. It remained normal and the man made a rapid convalescence. At St. George's they had also tried the effect of anti-diphtheritic serum in a certain number of cases. This serum had been used in view of the effect apparently produced by it in a case of broncho-pneumonia. The patient, a girl, was admitted under his care during this year at the age of 3½ years. She had been ill for twenty-four hours before admission, the temperature was 102° F., and there were signs of broncho-pneumonia, together with extreme difficulty in respiration and much recession of the intercostal spaces. There was a history of diphtheria in the family. The symptoms were such as to suggest that they were possibly dealing with obstruction of the larynx, due to the presence of a membrane. No membrane could, however, be seen in the fauces or larynx. It was thought best to give the child the benefit of anti-diphtheritic serum and accordingly 4,000 units were injected at once and 6,000 units a few hours later. In thirty-six hours the temperature was normal, and the patient made an uninterrupted recovery. Careful examinations were made of the material from the fauces and from the nose, but no diphtheria bacilli were discovered. Another child, aged 16 months, was under the care of Dr. Rolleston. The temperature was 104° F. and there was a history of illness, viz., broncho-pneumonia, of fourteen days duration. The child received 5,000 units of anti-diphtheritic serum. The temperature fell next day, and in twenty-four hours became normal and remained normal until the child left the hospital. There was no evidence of diphtheria. On the basis of those two cases, both of which were severe, and in both of which, coincidentally with the administration of the anti-diphtheritic serum, the temperature fell, they thought it advisable to try the effect of that serum in certain cases of pneumonia. The first patient was a girl of 6 years of age. The temperature was 102° F. and there was consolidation in the right upper lobe, together with some bronchitis in the left lung. Six thousand units of anti-diphtheritic serum were given, and the temperature the next morning was normal, and remained so. A woman, aged 36, was admitted on the third day of the disease with consolidation of the left lower lobe and a temperature of 101·8° F. Twelve thousand units of anti-diphtheritic serum were given, and the temperature began to fall next day and was normal on the morning of the day following and remained so. A woman, 38 years of age, was admitted on the fourth day of the disease with a temperature of 104° F. and consolidation of the left lower lobe and a portion of the left upper lobe. There was a systolic mitral murmur. Twelve thousand units of anti-diphtheritic serum were given and the temperature fell slightly, but did not become normal until the eighth day of the disease. In one case they gave 20 cc. of fresh horse serum, but in this instance there was no particular result. He would not have brought forward these cases had he not been asked to do so at that meeting, and although he did not suggest there was anything more than coincidence in the effects observed after the use of the anti-diphtheritic serum, he called attention to the fact that all the cases dealt with were severe ones. The serum had been given only when the prognosis seemed somewhat grave, and in no case in which it was given had the temperature subsequently reached the point at which it stood before its administration.

Dr. H. A. Caley said the series of cases at St. Mary's Hospital, though not large—437—might be taken as fairly illustrative, particularly in that care had been taken to check the clinical notes by the post-mortem records of those cases which terminated fatally. Cases of pneumonia complicating other diseases had been rigidly excluded. With regard to the aggregate mortality of 20 per cent. it must be remembered that with hospital cases the mortality-rate was relatively high because of the large proportion of alcoholic and otherwise debilitated subjects, and the fact that every year a considerable number of patients were admitted in the last stage of the disease, the fatigue attending their removal to hospital robbing them of their last chance. Subdivided into decennial periods, that series accorded with his general impression, based upon experience of both hospital and private cases, that with healthy adults below middle life, if treated carefully from the outset, the mortality was considerably lower, probably between 10 and 15 per cent. Generally, the series tended to demonstrate that pneumococcal infection, when primarily affecting the lungs, was comparatively rarely accompanied or followed by the remote lesions found in the more generalised type of pneumococcal infection, *e.g.*, peritonitis or arthritis. On the other hand, the local complications of the disease were seen to be of the first importance, empyema and pericarditis being conspicuous, and, of the two, empyema was the more frequent. From statistics of St. Mary's Hospital this was evident. A point he looked into was as to the extent to which the occurrence of empyema affected the prognosis of pneumonia. In the series of figures from his hospital the aggregate mortality of all cases was approximately 20 per cent., while in cases complicated by empyema the mortality was 33 per cent., and in order to have some sort of check upon that, he had also collected over the same period of time a series of 88 consecutive cases of empyema, cases which were admitted for the empyema, most of which had a definite or doubtful history of pneumonia beforehand, and the mortality of those was between 20 per cent. and 25 per cent. Therefore it seemed that the occurrence of empyema very materially increased the gravity of the illness, but not so much so as some statistics suggested. Another point into which he had looked was the bearing of the date of the operation in the initial illness on the prognosis. It was clear that the more quickly the operation was undertaken, *i.e.*, the sooner thorough drainage was established, the better was the prognosis, both with regard to life and with regard to the duration of the illness. On the other hand, where there was a long interval between the primary pneumonia and the opening of the empyema, there was a much greater likelihood of the formation of loculated collections, which always increased the patient's danger. The point he wished specially to bring before the Section was the causation of heart failure in pneumonia. Pericarditis was only a rare cause of heart failure, but when it did occur the mortality was very high. In his cases the mortality of pneumonia complicated by pericarditis was 90 per cent., and in most of those cases where careful examination was made after death myocarditis was found associated with the pericarditis, as in the case of rheumatic pericarditis.

Infective endocarditis only accounted for two cases out of his series. He believed Dr. Mackenzie spoke of 2 per cent. of the cases being complicated by endocarditis, which seemed a high figure. He wished to know whether it was certain that no cases were included in that list in which there had been previous endocarditis. His own experience was that the proportion of cases of endocarditis which seemed to originate in pneumonia was smaller than that. Pericarditis and endocarditis only accounted for a very small proportion of the cases of death from heart failure, and yet it was known that death from heart failure was the usual event in the grave cases; the explanation was to be found in the frequency of myocardial changes. He had carefully looked into the question as to the extent of muscular weakness of the heart, apart from pericarditis or endocarditis. More or less cardial dilatation was noted in 192 out of the 437 cases. He thought that the proportion would be larger still if the point were investigated in all cases of pneumonia, for more or less myocardial weakness was a usual incident of the disease. It was only when it got beyond a certain point that it could be rightly regarded as a complication. He wished to raise the point as to what extent the muscular weakness of the heart in pneumonia was due to mechanical causes, and to what extent to myasthenia. The dilatation of the right side of the heart was, no doubt, partly mechanical in origin, the outcome of the extra strain in the right ventricle, caused by the obstruction of the pulmonary circuit. Hence the relief afforded in some cases by venesection. But that was not the only factor. Clinical and post-mortem observations showed that there might be more general dilatation affecting the left as well as the right side of the heart, and there might be a very marked myocardial weakness without much dilatation. To account for this myasthenia he thought there were at least three other possible factors—toxæmia, pyrexia and deficient oxygenation, all of which were usually present in grave cases of the disease. If to the heart, already suffering from the mechanical embarrassment which the disturbance of the pulmonic circulation involved, there was added progressive myasthenia, it was not surprising that heart failure was responsible for most of the deaths. Under the heading of mechanical causes the first factor was, obviously, the embarrassment of the pulmonary circulation, and secondly, there was deficient aspiration of the thorax. To what extent the latter was important it was difficult to prove, but it must come into play. In addition, there might be certain forms of positive pressure—intrapleural pressure from fluid and, very rarely, intracardial pressure from pericardial effusion. Another important factor in some cases was pressure from beneath the diaphragm, due to dilated stomach, dilated colon, or general tympanitis.

The second group, the myasthenic, seemed to him to be more important than the mechanical one in the production of the heart failure. He referred to the three depressants: toxæmia, pyrexia, and deficient oxygenation. In bad cases of pneumonia those three acted together. Then there was the myasthenia associated with inflammatory lesions—pericarditis, myocarditis, and endocarditis. In all the fatal cases which had been examined, the heart muscle was found to be more or less involved. He thought it certain that those factors must come into play in cases of heart failure from pneumonia, the only question being as to their relative importance in different cases. Another possible factor was the neuro-paralytic from toxæmic depression of the nerve centres. There were certain cases of pneumonia, especially fulminating cases following influenza, in which death rapidly occurred with symptoms of cardiac and respiratory failure, and the question was whether some of those cases were not really due to toxæmic depression of the medullary centres. It was a difficult point to prove, and difficult to gauge at the bed-side. But, in considering the heart failure of any case of pneumonia, the two main groups, the mechanical and the myasthenic, must be considered, and the relative importance of the sensual factors carefully estimated, the more so in that each factor had its therapeutic correlative. He believed that primary weakness of the heart muscle, due to toxæmia, pyrexia, and deficient oxygenation, was more important than was usually thought.

With regard to the digestive complications of pneumonia, in his 437 cases there was no instance of colitis, although diarrhœa was present in a certain proportion; one case had been brought to his notice of acute pneumococcal empyema following acute colitis, in which, on bacteriological examination, the *Bacillus coli* and the pneumococcus were both found in the pus. Dr. Pasteur had referred to acute paralytic dilatation of the stomach, but from the point of view of prognosis, Dr. Caley thought one must remember that the majority of cases of dilated stomach were not of that grave form, but due to progressive distension of the organ, and gradual stretching of its walls—the result, not uncommonly, of too frequent or injudicious feeding.

In regard to serum or vaccine treatment, he had knowledge of only two cases. One was a post-pneumonic ulcerative endocarditis, affecting both sides of the heart, in which anti-streptococcic serum was used, but without effect, and the patient died. The other case was not one of his own, but one which was brought under his notice. The patient had an attack of pneumonia, with delayed resolution, and in many respects it closely resembled tubercle. Repeated examination was negative in regard to tubercle, but positive with regard to pneumococci. An anti-pneumococcic vaccine was prepared, and under its administration the patient made a good convalescence.

The last point to which he wished to refer was that concerning exposure in inducing pneumonia. Dr. Latham had referred to it, and had adduced evidence to show its importance. He, Dr. Caley, wished to submit the other side of that. Some years ago he made careful enquiry into the mode of onset and antecedents of a large series of cases of pneumonia, and found that if one was careful to exclude the fallacy of the initial rigor as evidence of "chill," this was much less common than is popularly supposed, but, on the other hand, in a large proportion of the cases there was evidence of antecedent nasal or naso-pharyngeal catarrh. He believed the important point was exposure, "chill," over-fatigue, or other lowering influences acting in the presence of pneumonic catarrh of the upper air passages, and not such extraneous factors alone—a consideration which had an obvious bearing on the prophylaxis of pneumonia.

Dr. Samuel West said he would not burden the Section with figures, but would make a few comments on matters which had interested him in the series of cases. One point, to which he believed reference had not been made, was in relation to the pulse and its ratio to the respiration, which was so characteristic of pneumonia, but was not pathognomonic in the sense of occurring in that disease only. He referred to the fact that it was often more marked during early convalescence than during the acute stage. The mechanical impediments in the lung persisted, and so the respiration did not fall as rapidly as the pulse, consequently in some cases the pulse-respiration ratio might be more perverted during convalescence than during the acute stage. He did not know how often the knee-jerks had been referred to during the discussion, and he did not know what Dr. Latham had in his mind, because the knee-jerks varied at different stages of the disease. He believed they were indebted for the observations of the knee-jerks to Dr. Stanley Barnes, of Birmingham, who wrote a very good paper on the subject. Dr. Barnes stated—and in regard to that Dr. West was ready to confirm the statement—that the knee-jerks were present at first as usual, *i.e.*, up to the third day. On the seventh day they became impaired or absent, generally absent. On the eighth or ninth they increased, and finally became normal again at the end of a fortnight. It therefore depended at what stage of the illness they were examined as to what their condition would be. Dr. Barnes also said that the knee-jerks were important with regard to prognosis—that where they disappeared late the prognosis was more favourable, and where they disappeared early the outlook was more grave. It was also said that they were important in diagnosis, for in tubercular pneumonia not pneumococcal they were increased, not diminished, and in septic pneumonia they were unaltered. On those points he had no personal observations to offer. Reference had also been made to some of the spinal symptoms which, curiously enough, were present in some of the cases. Cases presenting symptoms suggestive of meningitis were common enough in children, and in some the symptoms of cerebro-spinal meningitis might be closely simulated. There was another group in which spasms and twitchings of muscles occurred sufficient to suggest some acute spinal infection. Such symptoms occurred only early in the disease, and were not common. As the disease became definite and marked, the spinal symptoms disappeared. Such cases were very puzzling at times.

The last point on which he would speak was that to which a good deal of reference had been made, namely, the general question of pneumococcal infection. A series of statistics had been supplied, all leading to certain conclusions, namely, that pneumonia was followed in such and such proportions of cases by such and such complications and sequelæ. These statistics showed that many of those infections were rare, *e.g.*, meningitis was rare, spinal lesions were rarer still, and pericarditis and peritonitis also were by no means common. Yet when one read the papers on general pneumococcal infection, one was surprised at the number of cases recorded. To take one instance, that of arthritis, statistics showed beyond dispute that arthritis was a very rare affection as the result of pneumonia. Yet it was surprising to read of the number of cases of so-called pneumococcal infection of joints which had occurred in some people's experience.

With regard to the relation of pneumonia to those general infections, the opinions of authorities diffe. widely. It used to be held that blood infection was by no means common in pneumonia, but that was not the view now, for with care the pneumococcus might be demonstrated in the blood in most cases. Some had been led from this to conclude that pneumonia was a general infection with local manifestations in the lung. Arguing in the same way the same might be said of the other pneumococcal infections. But, if that were so, it was curious that one part of the body should be so often affected without any secondary complications, so that it seemed necessary to conclude that the pneumococcus was a germ which was easily satisfied, and when it had produced a lesion in one part of the body it did not trouble to produce another. That was not a probable or satisfactory conclusion, and some alternative was required. For his own part he was inclined to regard pneumonia as a local infection with secondary complications in a small number of cases, and it was towards this view that clinical investigation and observation seemed to lead. How were these divergences to be reconciled? The most probable conclusion was that the pneumococcus met with under these different conditions was not the same organism as that responsible for pneumonia. Morphological similarity was no proof of pathogenic identity. He believed that further research would result in the same views being held with regard to the pneumococcus which were now accepted in regard to the streptococcus, and that under the term pneumococcus were comprehended different strains or varieties morphologically allied, but with different pathogenic idiosyncrasies.

Dr. TIRARD said the Section felt much indebted to Dr. Hector Mackenzie and those who had contributed the statistics, but he was afraid lest in considering the statistics the patient might be forgotten, lest in having before them all the dangers they might fear a little too much and lose heart unduly when confronted with serious symptoms. He felt this especially with regard to the comparative importance attached by the opener of the discussion to pleurisy which required tapping, to gangrene of the lung, and to abscess of the lung. Dr. Mackenzie said that in nearly all those cases the conditions were fatal. But that was scarcely his, Dr. Tirard's, own experience. He had in mind many cases of each of those conditions which showed that the mortality was scarcely so great as the figures supplied would lead one to suppose. Again, Dr. Mackenzie said that a large proportion of the fatal cases between the ages of 7 and 19 had had some kidney complication, and appeared to associate the kidney trouble with the death. He, Dr. Tirard, had seen numerous cases of toxæmic symptoms in connection with pneumonia, but he had not seen cases in which he could definitely say that the symptoms were due to uræmia. On the other hand, he had not seen cases in which subsequent to the attack of acute pneumonia permanent albuminuria resulted, or permanent nephritis. He thought that a large proportion of the fatal cases in which some kidney complication had been present might have been cases in which a pre-existing trouble had been unnoticed there until the time of the pneumonia. He did not believe there were features in the acute nephritis met with in pneumonia different from those in any other types of disease, that is, an acute nephritis which was limited to an acute stage, and not likely to be followed by chronic lesions. He also wished to raise the question about hæmoptysis, to which Dr. Mackenzie had not referred. He would like to hear whether those who made the statistics regarded hæmoptysis as a necessary symptom of the disease or as a complication. It certainly was a feature of pneumonia, and he was inclined to regard it as a complication, though it was one, he thought, of a hopeful nature rather than of serious import. Sir William Jenner many years ago remarked that in young people with severe hæmoptysis and a high temperature in pneumonia the prognosis was almost invariably good.

Dr. FAWCETT said that most of the points had already been touched upon, and he had little to say about the statistics from Guy's Hospital, except that those figures did not include "terminal" pneumonias, as Dr. Herringham said the St. Bartholomew's figures did. Possibly that explained the fact that the death-rate at Guy's was shown as lower than at any of the other hospitals, as, if the "terminal" pneumonias were included, the death-rate approached 20 per cent. He had been specially interested in Dr. Mackenzie's reference to the St. Thomas's cases, viz., that there had been no case of serous effusion which required tapping, and although recognising it as a rare complication he thought the experience of St. Thomas's was exceptional. Therefore he, Dr. Fawcett, investigated the 15 cases at Guy's which had been indexed as "pleurisy with effusion," to see how many of them had required tapping; there were only 3 cases, and in each of them the quantity of fluid removed was small, varying from half a pint to a pint. In two fatal other cases 12 and 15 oz. were found at the post-mortem examination. The 3 cases which had been tapped recovered. In 4 cases the diagnosis was arrived at from physical signs alone. In 2 cases the diagnosis of "primary pneumonia" was doubtful, and in 2 other cases the question of fluid being present at all was, he thought, quite doubtful. In looking through the various figures Dr. Fawcett noticed that the number of cases of "pleural effusion" varied between 0 and 25; if these figures were to be of any real value it was essential that they should be analysed, as has now been done with the Guy's cases, showing exactly what was the true value of the heading. There was no case amongst those from Guy's Hospital of chronic pneumonia following lobar pneumonia, and in another connection he had looked up the post-mortem records of chronic or fibroid pneumonia over a period of twenty-four years at Guy's and could not find 1 definite case. In 3 cases in which the change was supposed to have ensued after a pneumonia he thought that it was doubtful if any of the patients had had lobar pneumonia.

Dr. BUTLER HARRIS desired to refer to the vaccine treatment of pneumonia. Looking at the bacteriological work which had been done on the subject one found that observers who had used large quantities of blood of cases of acute pneumonia invariably were able to grow the pneumococcus.[1] It was, therefore, difficult to understand why there were not more local manifestations of the infection in cases of the acute disease. That might be owing to the very nature of the micro-organism, for it died very rapidly and would only live under the most favourable surroundings. If an attempt were made to grow it outside the body, it would only grow at all freely in agar which had been treated with blood-serum. He had practised inoculation in several cases which had come under his notice in private work. The first of those Dr. Hawkins saw with him. A lad, 18 years of age, had a definite attack of acute pneumonia in December, 1905. The left base of his lung did not wholly clear for six or seven weeks, the temperature varied between 99° F. and 102° F., and the clinical condition seemed to suggest acute tuberculosis. However, repeated examinations of his sputum failed to reveal the tubercle bacillus, and the opsonic index to tubercle was invariably normal. On the other hand, his sputum contained swarms of pneumococci, which, after some difficulty, the speaker was able to grow. He suggested to Dr. Hawkins that some good might be done by a bacterial vaccine made from the boy's own cultures. That was done, and he inoculated the patient with 10,000,000 dead pneumococci. The unexpected happened, for the boy went through a phase which could be only likened to an ordinary crisis. He had a profuse expectoration of rusty-coloured stuff, not purulent, which negatived the suggestion of inter-lobar abscess. His temperature dropped, and in thirty-six hours the disease was over, after having lasted seven weeks. In another case a somewhat alcoholic man was seen on the fifth day of the disease, with slight pneumonia at the left base, which had not resolved. He had definite peritoneal trouble, effusion into his left ankle-joint, and thrombosis of his left posterior tibial vein. He was in a state of acute delirium but not high fever. The speaker suggested that it would be advisable to insert a trocar into a vein in his arm and to run the blood into a number of culture tubes. That was done, and a sufficient amount of the pneumococcus grew to make a vaccine in twenty-four hours. The result was remarkable. The man's index to pneumococcus before inoculation was ·4. He was inoculated with 10,000,000 pneumococci, and within thirty-six hours his condition began to improve, his peritoneal, stomach and intestinal conditions were better, and the effusion began to subside. Twelve hours later his temperature began to rise again. Observation of his opsonic index twenty-four hours after the first inoculation showed that it had risen to 1·2, but it rapidly fell again, and during the next twenty-four hours it had fallen to ·6. It was therefore decided to inoculate him again and to continue the inoculations if desirable; the local foci gradually cleared up, though it required inoculations every other day for eight days to maintain his bacterial resistance, and he made a complete recovery. Those who watched this case came conclusively to the opinion that the inoculations were not merely coincident with an improvement in the man's condition, but were the determining factor. During the last few days the speaker had had another very interesting case, in which the pneumonia was not caused by the pneumococcus, but by the ordinary Staphylococcus albus. The patient was a woman, aged 26. Her attack started with profuse hæmoptysis, which lasted two days; on the third day the temperature was 103° F. and she had physical signs of consolidation at the left apex. There were also many coarse, moist sounds. The sputum showed nothing but staphylococcus. Three days later the middle lobe of the right lung became infected, and the following day, the sixth day of the disease, the lower lip and the right side of the face began to swell, and during the next two it spread round the right side of the face to the back of the neck and involved the left ear, forming a general œdema, with a vesicular eruption. From one of the vesicles on the cheek he obtained a pure culture of staphylococcus, and the next day obtained the same micro-organism from a vesicle on the right ear. Clinically, she was now suffering from a severe toxæmia. She was getting into that toxic state which one concluded would have a fatal issue, for her heart was failing, with a temperature of 105° F., respiration 44, pulse 104. He had made a vaccine from the staphylococcus, which usually grows very readily. A hundred million staphylococci were injected at noon, and the temperature dropped in five hours from 104° F. to 99° F. From acute delirium she sank into a peaceful sleep, slept well all night, and seemed much better the next morning, when her temperature rose to 101° F. for a few hours only. The following night she was somewhat restless, and next morning did not appear quite so well. She was therefore given another dose of staphylococcus vaccine, forty-eight hours after the first inoculation. After the second injection the temperature fell, never to rise again, and the patient made an uninterrupted recovery. These cases have been cited because they were not normal cases of pneumonia and because it appeared more than probable that the recovery in each instance was not a spontaneous one coinciding with the inoculation. He could not give any statistics, because sufficient cases had not been accumulated, but Dr. Hawkins asked him to be present and state the result of his early efforts in the inoculation of a pneumococcic vaccine.

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[1] Roseman, 1905, found pneumococci in the blood of 160 cases out of 175. Frankel found pneumococci constantly in the blood. Prochaski, 1901, found them in the blood of 50 consecutive cases.

In the early days the anti-pneumococcic serum failed miserably, and he thought the reason was, firstly, that generally a serum was not effective unless it happened to contain some dead bodies of the infective micro-organism, and secondly, because the pneumococcus was pathologically an extremely variable organism. The experiments in the laboratory succeeded to some extent because one strain of pneumococcus was used for infecting the animal and the same strain of serum was used for the inoculation. Directly variations were introduced the whole thing failed.[1] He had done a few inoculations, using strains derived from sources outside the particular individual in chronic infections of the pneumococcus, but the attempt had failed, and he thought that if a pneumococcic vaccine was to be reliable it was essential it should be made from the cultures obtained from the case for which it was to be used.[2]

Dr. LANGDON BROWN said that his remarks were based on those cases from St. Bartholomew's Hospital in which the bacteriological evidence was complete. All the cases were severe ones, and in fact most were fatal ones. One point came out which partly answered Dr. West's difficulty, namely, as the pneumococcus could be generally found in the blood, how was it that it so seldom produced metastatic deposits? He, Dr. Brown, found that in many cases the organism had only been made to grow by taking a comparatively large quantity of blood and inoculating it into about 150 cc. of sterile milk so as to dilute the bactericidal properties of the blood. But such conditions were abnormal. In the circulation the organism, though there, could not produce toxic results or metastatic deposits until the resistance of the organism had been seriously lowered. He had tried to see from his statistics whether any broad distinctions could be drawn between the kind of complications that might be expected when the lung was the route of infection and those occurring when some other path was adopted. But not much result could be arrived at beyond the obvious ones, *e.g.*, that when the ear or tonsil was the focus, lateral sinus thrombosis and cerebral abscess are common, and that pneumococcal infections of the appendix and Fallopian tubes led to peritonitis much more often than pneumonia did. Otherwise the results were much the same whatever the focus. In one case of pneumonia there was no sign of meningitis, yet fluid from the subarachnoid space yielded pneumococci in abundance. This had an interesting bearing on so-called "cerebral pneumonia." The lists of figures were considerably curtailed by the omission of cases under 10 years of age. The liability to secondary pneumococcal infection was greatest in early life. No less than 64 per cent. of those dying under 21 died from secondary infections, whereas secondary infections at all ages were not nearly so common. The average age of death in his series of general pneumococcal infections was 15½ years, *i.e.*, the age at which the prognosis of ordinary pneumonia was particularly good. It would suggest that while the local lesion was sufficient to cause death in older persons, the more resistant young person could tolerate a greater degree of infection before succumbing. As the hour was late he would not discuss the matter further.

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[1] Foa (Washbourn and Eyre) notes that a common pneumococcic serum did not invariably protect.

[2] Macdonald, London Hospital, conclusively showed in rabbits in 1905 that a pneumococcus vaccine made from the same strain as the infecting micro-organism invariably (1) protected, or (2) gave an artificial crisis, according to the date of introduction.

Dr. HECTOR MACKENZIE, in replying on the discussion, said that when one came to review the statistics supplied by the various hospitals, one could not but be struck by the almost mathematical regularity with which the complications occurred. It was remarkable that there had been so little variation in the proportion of cases complicated with empyema, pericarditis, &c., at so many different hospitals. The same held true for other hospitals, even those so widely separated as New York and Berlin. When one reflected how regularly the proportion of fatal cases increased with each decade, whatever might be the method of treatment, one could not fail to see how largely the fighting powers of the body against the pneumococcus were influenced by age. It came out very clearly from the various statistics that sex had a great deal to do with the incidence of pneumonia, especially among the working classes. Dr. Latham had suggested that it pointed very strongly to exposure. No doubt it did, but he, Dr. Mackenzie, thought that, among the labouring classes particularly, the great prevalence of spitting habits among the men was an important factor. He did not think women were guilty of the same practice. He thought that was largely instrumental in spreading pneumococcal infection among men of the working classes. It was, perhaps, as well that he had not an opportunity of seeing the statistics of any hospital but his own previous to the last meeting, for the record which had been placed before them, in close agreement with the outline which he had already drawn, showed how regular were the features of the disease. The total number of cases included in all the reports was 7,868, and of these 1,722 terminated in death, or 21·8 per cent. One point which came out was that altogether the complications of pneumonia were uncommon. Empyema was the only one which might be said to be specially frequent, and that occurred in 290 cases, or 3·7 per cent., of which 88 cases were fatal. The frequency with which empyema had occurred at the different hospitals had varied more than in the case of any other complication, and it did not seem very obvious why that should be so. Thus, at Charing Cross Hospital, St. Thomas's, and St. Bartholomew's the frequency of its occurrence had varied between 1·2 and 1·6 per cent. At six other hospitals it had been between 4 and 5 per cent., while at Guy's it had been 7 per cent., and at Westminster 8·2 per cent. He was somewhat surprised to find that at St. Thomas's only 10 cases had been observed in ten years, and it was possible that a search among cases entered as empyema in the registers might show some other cases admitted as pneumonia which had developed empyema. Dr. Gossage had explained why Westminster Hospital had such a large proportion of cases of empyema, namely, that the cases were included which came in as empyema, and not only those which developed empyema after an attack of pneumonia in the hospital. Simple pleural effusion was recorded in only 125 cases, or 1·6 per cent., and of those 125 cases 13 were fatal. It was remarkable that at one of the hospitals paracentesis for serous effusion was performed twenty-five times, whereas at six or seven other hospitals it never seemed to have been done at all. That was a variation in practice which he could not explain. Dr. Tirard seemed to think that he, Dr. Mackenzie, had drawn a very gloomy picture of the complications of pneumonia. But he was careful to point out in his opening remarks how comparatively rare the complications were which were fatal. Although cases of recovery from gangrene of the lungs had been recorded, he did not expect as many as eight out of thirty-seven would have been reported. He would still regard gangrene as a very grave condition, in which a gloomy prognosis was justified. He was not sure that all of them would have admitted the cases recorded as gangrene to be such if they had seen them. It was very difficult to distinguish between a case of gangrene of the lung and one of abscess of the lung which had become fœtid. He had said, not that pericarditis was a more frequent complication than empyema, but the one next most frequent to empyema. It was among the fatal cases that any large proportion of pericarditis was met with. In the whole series of fatal cases in that investigation, pericarditis occurred in 10·6 per cent., while in the cases which were not fatal it was recorded in less than 1 per cent. In a considerable number of the cases of pericarditis it was not recognised during life, and accordingly it was possible that the complication might have been more frequent than the figures indicated. Dr. Hadley's remarks about surgical treatment of pericarditis he did not quite follow. He thought all had been on the look-out for a long time past for cases of pyo-pericardium in which surgical treatment was indicated. Dr. Fawcett and Dr. Sibley had each recorded a very interesting case, but such cases were very rare. The recorded cases of pyo-pericardium due to pneumonia and treated by incision could be counted on the fingers of one hand. The combined statistics indicated that peritonitis was one of the very rare complications, only 22 such cases being recorded, or ·3 per cent. of the whole. Of those, 5 cases recovered, 17 died. Otitis and meningitis also were rarer complications, of the former of which 29 cases were recorded, or ·47 per cent. Dr. West had suggested that pneumococcic infections such as arthritis were more common than was generally thought. Under 100 cases of arthritis, however, had been recorded in literature, and he thought the reason why pneumococcic arthritis seemed more common than it really was, was that each surgeon who recorded a case appended the literature of all the previous cases which had been reported, and in that way one got an exaggerated idea of the frequency of this form of arthritis. Under all methods of treatment pneumonia ran a most favourable course in young people, and the cases which died were generally those which got acute bacteriæmia. In those cases kidney complications often ensued. A remarkable point was the extreme divergence in the experience in different hospitals in the matter of albuminuria. At Guy's it was present in 109 out of 727 cases; whereas, in the records of other hospitals, there were only 12 cases out of 988. He thought the Guy's Hospital figures were the correct ones, because some years ago he, with others, made an investigation into the complications of pneumonia and found as high a proportion of albuminuria as indicated in the Guy's Hospital figures. It was not one of the points which were asked to be included in the returns, hence he thought the information on the point was incomplete and could not be taken as authoritative.

Among the criticisms which he had heard, not in that room but outside, with regard to the discussion was: "What has been the good of it? Is not all that has been said here to be found recorded in the ordinary text-books? Has the discussion added to or advanced our knowledge in any degree? What is the practical outcome of it all?" And to these fair questionings he would reply by saying that he did not know any text-book, ordinary or special, which gave such an accurate and complete picture of the complications of pneumonia as was supplied by a study of the hospital reports. Conclusions founded on the experience of one man or one hospital were apt to be narrow and erroneous, and everyone must profit by learning what was going on beyond his own limited horizon. That Society existed for the advancement of knowledge and the attainment of greater unity of opinion, and, after all, it was in regard to those diseases most prevalent and most deadly that it is most important that work should be done. Some of them must plod along the well-worn causeway, but they might feel inspirited by the knowledge that along that path lay the surest way to that goal towards which they must press in their endeavours to acquire the mastery over disease.

He had been able to say but very little in his introductory remarks concerning serum and vaccine treatment. The serum treatment was at the present time an acknowledged failure, but it might not long remain so. He thought that longer trials with present knowledge were useless. But if they could not employ passive immunisation they could fall back on active immunisation, and the vaccine treatment of pneumonia was still practically untried. He did not think the few cases of which they had heard that day were conclusive, but they were encouraging. The majority of young subjects recovered, and it proved nothing to show that they had recovered after injections of vaccine. The results which he quoted from Dr. Boellke were too few to be conclusive, but they, too, were encouraging, and he suggested as a practical result of the discussion that the Society should ask the various hospitals to investigate for it the value of vaccine treatment, to appoint someone at each hospital who would superintend and carry out the necessary details of the treatment, and report to the Society after an interval which allowed for a sufficient trial to have been made, so that it could be seen whether vaccine treatment was or was not efficacious.

Statistics of the Complications of Pneumonia.

(Compiled at the various London hospitals to provide a basis for the above discussion.)

FROM ST. THOMAS'S HOSPITAL.

CONTRIBUTED

By H. C. Squires, M.B.

MEDICAL REGISTRAR.

Number of cases of pneumonia in decade 1897-1906	750
,, deaths ,, ,, ,,	146
Mortality-rate	19·3 per cent.

Sex : males 611 ; mortality-rate 19·8 per cent.
,, females 139 ,, 16·5 ,,
No cases are included below the age of 10 years.

Complications.

Pleural effusion requiring paracentesis	None.
Empyema	10 cases, 5 died.
Gangrene of lung	None.
Abscess of lung	3 cases, all died.
Pericarditis	28 cases, 19 died.
Endocarditis	15 cases, 10 died.
Peritonitis—general	1 case, fatal.
,, localised abscess	2 cases, both recovered.
Otitis	1 case, doubtful.
Meningitis	1 case, fatal.
Arthritis	7 cases, all recovered.
Colitis	1 case, recovered.
Diarrhœa	9 cases, 3 died.
Thrombosis	9 cases, 1 died.
Peripheral neuritis	None.
Chronic pneumonia (continued fever)	10 cases, all recovered.
Nephritis	16 cases, 9 died.
Albuminuria	7 cases, all recovered.
Mediastinitis (with pericarditis)	2 cases, both died.
Urticaria	2 cases, both recovered.
Jaundice or bile in urine	2 cases, both recovered.

These 126 complications occurred in 100 cases. In 650 cases, or 86·6 per cent. of the total number, no complications were noted.

Remarks.

Empyema.—Of the 10 cases, 9 were males. Of the 5 fatal cases, 2 were complicated with endocarditis and 2 with purulent pericarditis, while the remaining case was uncomplicated. Of the 5 non-fatal cases, one was complicated with pericarditis and peritoneal abscess, while the others were uncomplicated.

Pericarditis.—Of the 28 cases, 22 were males. Of the 19 fatal cases, there was also endocarditis and mediastinitis in 1, mediastinitis in 1, meningitis in 1, and empyema in 2. In these 19 cases the lower lobe of left lung was involved in 10, and in 7 of these the disease was limited to that lobe. Of the 9 non-fatal cases, the lower lobe of left lung was involved in 7.

Endocarditis.—Of the 15 cases, 10 were males. Of the 10 fatal cases, there was also empyema in 2, osteo-myelitic abscess in 1, abscess of lung in 1, thrombosis in left leg in 1, cerebral embolism in 1, nephritis in 1, pericarditis in 1.

The mitral valve was alone affected in 3 cases, aortic alone in 1, mitral and tricuspid in 1, left ventricular wall and tricuspid in 1, aortic, mitral and tricuspid in 1.

Abscess of Lung.—In the three instances the diagnosis was not made during life.

Peritonitis.—In the fatal case of general peritonitis the patient, aged 25, died on the sixth day of the illness, with consolidation of right lower lobe, vomiting, constipation and abdominal distension. No culture was made. In one of the cases of peritoneal abscess the pneumococcus has grown from the pus.

Meningitis.—From the only instance a staphylococcus was obtained.

Arthritis.—In no case did suppuration occur; but in one case, not included under this heading, pus was present around, but not in, the ankle-joint.

Colitis.—Passage of blood and mucus in 1 case.

Diarrhœa.—In one man, aged 21, who died on the eleventh day of his illness, and who had had as many as fifteen stools in twenty-four hours, acute dilatation of the stomach was found post mortem.

Thrombosis.—Of the 9 cases, 5 were males. Endocarditis was present in the fatal case. In 6 cases the left leg, in 3 cases both legs were affected.

Nephritis.—Of the cases that recovered, 1 was admitted with acute nephritis, and was found to have pneumonic consolidation as well, 1 had had a similar attack of acute nephritis six months before, 1 had blood and epithelial casts in urine (less than 4 oz. of urine a day for three days), 1 had jaundice, albuminuria and epithelial casts. Of the fatal cases, several were examined microscopically.

Albuminuria.—In 7 cases there was albuminuria without evidence of nephritis. The albumen (one-sixth to one-third on boiling) disappeared during convalescence.

Continued Fever (Chronic Pneumonia).—There was unusual continuance of fever in 10 cases. In 4 of these tubercle bacilli were looked for and not found; 4 others were aspirated without result. In 5 of these

10 cases the fever lasted from the onset for five or six weeks; in the other 5 cases the temperature having become normal rose again, and continued above normal for two to nine weeks. All apparently recovered.

Urticaria.—In 2 cases the rash appeared on the eighth or ninth day of the illness.

Jaundice.—In 1 case jaundice occurred; in another case bile was found in the urine for some days.

Serum Treatment.

In one fatal case three injections of an anti-pneumococcic serum were given. A case of general pneumococcic infection was treated with a similar serum without any effect. No vaccine has been used.

FROM MIDDLESEX HOSPITAL.

CONTRIBUTED

By W. Pasteur, M.D.

PHYSICIAN TO THE HOSPITAL.

Return of Cases of Lobar Pneumonia admitted during the Ten years 1897 to 1906, in Persons of 10 Years of Age and Upwards.

Age	No. of Cases	Recovered	Died	Mortality percentage
−20	153	145	8	5·2
−30	169	145	24	14·2
−40	99	65	34	34·3
−50	89	54	35	39·3
−60	39	21	18	46·6
+60	33	10	23	68·6
Totals	582	440	142	24·3

Complications were met with in 72 cases, of which 39 were fatal and 33 recovered. The frequency of each complication is given in the subjoined table:—

Complication	Total cases	Recovered	Died
Empyema	28	21	7
Pericarditis	17	4	13
Gangrene of lung	7	1	6
Abscess of lung	2	—	2
Pulmonary tuberculosis	1	1	—
Bronchiectasis	1	1	—
Pulmonary embolism	1	—	1
Venous thrombosis	3	3	—
Pleural effusion	1	—	1
Pneumothorax	1	—	1
Otitis media	2	2	—
Peritonitis	4	2	2
Acute endocarditis	1	—	1
Ulcerative endocarditis	1	—	1
Diffuse suppuration of lung	1	—	1
Acute mania	1	1	—
Acute nephritis	2	—	2
Peripheral neuritis	2	2	—
Acute dilatation of stomach	2	—	2
Arthritis	4	4	—
Gangrenous ulceration of colon	1	—	1
Purulent meningitis	2	—	2

FROM ST. BARTHOLOMEW'S HOSPITAL.

CONTRIBUTED

By W. LANGDON BROWN, M.D.

MEDICAL REGISTRAR.

PNEUMONIA.

	Total					Under 15				—20				—30				—40				—50				—60				Over 60			
		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1897 ...	97	67	14	12	4	19	4	—	—	15	2	1	1	12	5	1	—	10	2	3	3	7	1	2	—	4	—	4	—	—	—	1	—
1898 ...	93	64	16	12	1	9	6	1	—	16	3	—	—	17	4	2	—	12	3	3	—	7	—	1	1	3	—	4	—	—	—	1	—
1899 ...	129	80	25	22	2	15	7	1	—	22	3	1	—	13	3	3	—	19	7	11	1	7	3	4	—	4	2	2	1	—	—	—	—
1900 ..	135	88	20	21	3	14	1	—	—	20	10	1	—	31	4	2	1	11	3	14	—	8	2	2	1	2	—	4	1	2	—	1	—
1901 ..	129	77	25	20	7	12	11	—	—	11	8	—	—	20	3	4	—	18	2	4	1	11	1	10	1	4	—	1	1	1	—	1	4
1902 ...	86	53	16	10	7	12	4	—	—	12	2	1	1	15	6	2	1	10	2	3	3	4	1	1	1	—	—	2	—	—	1	1	1
1903 ..	89	63	19	6	1	9	3	—	—	17	5	—	1	14	5	1	—	11	4	2	—	9	2	2	—	3	—	1	—	—	—	—	—
1904 ..	113	84	21	6	2	14	3	—	—	27	5	1	—	23	6	1	—	12	2	—	1	8	2	4	1	—	3	—	—	—	—	—	—
1905 ..	115	70	29	16	—	11	9	1	—	17	10	1	—	21	2	5	—	13	7	5	—	5	—	2	—	3	1	2	—	—	—	—	—
1906 ...	125	77	30	14	4	13	7	—	—	15	8	2	—	22	7	1	—	15	3	1	—	9	3	5	2	1	1	4	2	2	1	1	—
10 years	1111	723	215	142	31	128	55	3	—	172	56	8	3	188	45	22	2	131	35	46	9	75	15	33	7	24	7	24	5	5	2	6	5
Average of Death, per Sex				16·4	12·6			2·2	—			4·4	5 08			10·4	4·2			25·9	20·4			30·5	31·8			50	41·6			54·5	71·4
,, ,, Mean				15·5				1·6				4·6				9·3				24·8				30·7				48·3				61·1	

DISEASE:	Total	Dischrgd.		Died		Under 15				—20				—30				—40				—50				—60				Over 60			
						Dis-chrgd		Died		Dis-chrgd		Died		Dis-chrgd		Died		Dis-chrgd		Died		Dis-chrgd		Died		Dis-chrgd		Died		Dis-chrgd		Died	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
(1) Pleural effusion	23	15	3	2	3	3	—	—	—	1	1	—	1	5	—	—	1	2	—	2	1	3	1	—	—	1	1	—	—	—	—	—	—
(2) Empyema	18	10	2	5	1	3	1	—	—	2	—	—	—	3	1	1	—	2	—	—	1	—	—	2	—	—	—	2	—	—	—	—	—
(3) Gangrene of lung... ...	5	1	—	4	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	2	—	—	—	—	—	—	—	—	—
(4) Abscess of lung	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Chronic pneumonia ...	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
(6) Pericarditis	33	10	2	18	4	1	1	—	—	3	—	1	1	2	—	5	—	3	1	6	1	—	—	2	1	—	—	3	—	—	—	1	1
(7) Infective endocarditis ...	14	—	—	9	5	—	—	—	—	—	—	1	1	—	—	—	—	—	—	2	1	—	—	3	2	—	—	3	1	—	—	—	—
(8) Peritonitis	3	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—
(9) Otitis	5	2	1	1	1	—	—	—	—	1	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(10) Meningitis...	6	—	—	5	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	1	—	—	—	2	1	—	—	—	—
(11) Arthritis	7	4	1	1	1	2	—	—	—	—	—	1	—	—	1	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(12) Colitis (no cases recorded)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(13) Thrombosis	4	3	—	1	—	—	—	—	—	—	—	1	—	1	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(14) Neuritis	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

OTHER COMPLICATIONS.

	Total	Discharged		Died		Under 20				—30				—40				—50				—60				Over 60			
						Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died		Discharged		Died	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
GENERAL—																													
Septicæmia	2	—	—	—	2	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LUNG—																													
Bronchiectasis ...	1	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Infarcts in Lung ...	2	—	—	—	2	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
LIVER—																													
Catarrhal Jaundice	5	3	1	—	1	—	—	—	—	1	—	—	1	—	—	—	—	1	—	—	—	1	—	—	—	—	1	—	—
Abscesses	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
KIDNEY—																													
Acute Nephritis ...	12	11	—	1	—	3	—	—	—	2	—	1	—	5	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Pyuria	1	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Chronic Pneumonia.—(1) A man, aged 41. Delayed resolution; signs persisted on discharge. (2) A man, aged 31. Typical crisis on ninth day. When discharged there were still signs of consolidation with cavernous breathing. Diagnosis: "Cirrhosis of lung and dilated tubes."

Gangrene of Lung.—(1) A boy, aged 12. Right pneumonia, with typical onset. Temperature never sank. *No post-mortem examination.* ? Gangrene or empyema. (2) A man, aged 45. Lower half of upper and part of lower lobe in a state of advanced gangrene, with a large ragged cavity containing foul purulent fluid. The remaining parts of the lung were solid. (3) A man, aged 35. Onset acute. Temperature fell by lysis on the twelfth day. Subsequently it rose again, and he coughed up offensive sputum. The left base became dull, and the breath sounds and voice sounds were weak. Ultimate recovery. (4) A man, aged 40. Admitted on tenth day of left-sided pneumonia. Temperature, 103° F.—104° F. Profuse diarrhœa all the time. A heavy drinker. No mention of fœtor in the sputum. Died on sixteenth day. Post mortem.—Left lower lobe: Red hepatisation; in the upper part an irregular sloughing cavity, with no definite abscess wall, as large as an orange; similar patches, but smaller, in the rest of the lobe. (5) A man, aged 35. A heavy drinker. Temperature remained up till his death on the fourteenth day. Delirium tremens came on the day before his death. Post mortem.—Purulent meningitis. Right lung hepatised; in its upper lobe a patch had broken down into foul pus. Left upper lobe hepatised.

Abscess.—A man, aged 33. Died two months after the onset of acute lobar pneumonia. At the post-mortem the lung contained a cavity the size and shape of a bantam's egg, lined by a well-marked pyogenic membrane.

FROM THE LONDON HOSPITAL, 1897-1906.

CONTRIBUTED

By W. J. HADLEY, M.D.

PHYSICIAN TO THE HOSPITAL.

SEX INCIDENCE.

Age groups	Living males	Living females
10—19	574	192
20—29	372	121
30—39	215	60
40 on	212	55
	Dead	Dead
10—19	31	29
20—29	84	25
30—39	105	38
40 on	195	54
	1,788	574

N.B.—More than three times as common in males as females, and this increased incidence in the males is much the same in all the age groups. Actually most marked at 30—39.

Sex Mortality.

Age groups	Males	Females
10—19	31 deaths in 605 = 5·12 per cent.	29 deaths in 221 = 13·12 per cent.
20—29	84 ,, ,, 456 = 18·64 ,,	25 ,, ,, 146 = 17·11 ,,
30—39	105 ,, ,, 320 = 32·81 ,,	38 ,, ,, 98 = 38·77 ,,
40 on	195 ,, ,, 407 = 47·91 ,,	54 ,, ,, 109 = 49·54 ,,
Totals ...	415 ,, 1,788 = 23·21 ,,	146 ,, ,, 574 = 25·45 ,,

N.B.—Mortality increases rapidly with advancing years (no cases under 10 years old). Females show rather higher mortality all through, especially in the youngest age group.

Total mortality, males and females, 23·75

Distribution { Single 2112
Double 250

Pneumonia.

Antecedent Conditions.

Alcoholism.

Age groups	10—19	20—29	30—39	40 on		
	1	9	12	13	recovered	35
	...	9	26	35	died ...	70
Totals	1	18	38	48		105

Death-rate, 66·66 per cent.

N.B.—Alcoholism increases with years, and in such cases pneumonia is attended by a death-rate of 66·66 per cent.

Cardio-vascular.

Age groups	10—19	20—29	30—39	40 on		
Aneurism, morbus cordis	35	6	7	1	recovered	49
Pericarditis (antecedent)	13	7	10	12	died ...	42
Totals	48	13	17	13		91

Death-rate, 46·14.

N.B.—A good many of those recovering had old morbus cordis, but in spite of this the death-rate was high.

Chronic nephritis	Living	4	
Antecedent	Dead	19	... ... Death-rate 82·6
	Total	23	

Chronic pulmonary complaints	Phthisis	15	Living 54	... Death-rate 31·64
,, ,, ,,	Fibroid	24		
,, ,, ,,	Others	15		
Antecedent	Phthisis	13	Dead 25	
	Fibroid	3		
	Others	9		

Concomitant and Subsequent Conditions.

Sepsis	Living ...	8	
,, ...	Dead ...	22	... Death-rate, 73·33 per cent.
	Total ...	30	
Acute nephritis ...	Living ...	4	
,, ..	Dead ...	8	... Death-rate, 66·66 per cent.
	Total ...	12	
Delirium	Living ...	37	
,, ...	Dead ...	33	.. Death-rate, 47·1 per cent.
	Total ...	70	

Delirium tremens ...	Living .	23	
,, ,, ...	Dead ...	13	... Death-rate, 36·1 per cent.
	Total ...	36	
Pleural effusion (clear) ...	Living ...	17	
,, ,, ...	Dead ...	1	. Death-rate, 5·56 per cent.
	Total ...	18	
Pleural effusion (purulent)	Living ...	53	
,, ,,	Dead ..	20	... Death-rate, 27·39 per cent.
	Total ...	73	
Abscess of lung ...	Living ...	2	
,, ...	Dead ...	8	... Death-rate, 80 per cent.
	Total ...	10	
Gangrene of lung ...	Dead ...	3	... Death-rate, 100 per cent.
Endocarditis (acute) ...	Living ...	1	
,, ,, ...	Dead ...	12	
	Total ...	13	
Pericarditis	Living ...	4	
,, ...	Dead ...	43	
	Total ...	47	
Meningitis	Living ...	1	
,, ...	Dead ...	4	
	Total ...	5	
Neuritis	Dead ...	1	
Peritonitis	Dead ...	3	
Colitis	Dead ...	3	
Otitis	Living ...	3	
,, ...	Dead ...	1	
	Total ...	4	
Parotitis	Living ...	2	
,, ...	Dead ..	1	
	Total ...	3	
Thrombosis	Living ...	1	
Arthritis	Dead ...	2	
Pneumothorax	Living ...	1	
,, ...	Dead ...	1	
	Total ...	2	
Fibroid lung	Living ...	7	

VARIOUS OTHER SEQUELÆ.

Hyperpyrexia	Living ...	1
,, ...	Dead ...	4
	Total ...	5
Erythema nodosum ..	Living ...	1
Acute pancreatitis ...	Dead ...	1
Orchitis	Living ...	1
Appendicitis	Living ...	2
Cerebral abscess ...	Dead ...	1

d—14

FROM KING'S COLLEGE HOSPITAL, 1897-1906.

CONTRIBUTED

By J. Charlton Briscoe, M.D.,
MEDICAL TUTOR,
AND
H. W. Wiltshire, M.B.,
SAMBROOKE MEDICAL REGISTRAR.

Age period	10—20	20—30	30—40	40—50	50—60	60--70
Number of cases	65	72	45	43	13	6
Deaths	6	6	13	14	7	2
Mortality	9·2	8·3	28.8	32·5	53·8	33·3

Total number of cases, 244. Deaths, 48 (one death due to cirrhosis and hæmatemesis during convalescence from pneumonia). Mortality 19·59.

Sex: males, 174; females, 70.

Complications.

Serous Effusion.—Paracentesis was required in 8 cases, of which 2 died.

Empyema.—Seventeen cases, of which 4 died, aged 19, 54, 56, 61, respectively.

Gangrene of Lung.—One case, fatal, in a woman, aged 32.

Abscess of Lung.—One case, fatal, in a woman, aged 61.

Chronic Pneumonia.—One case, a man, aged 44. Influenza, interstitial pneumonia. He was seen alive six years later.

Pericarditis.—Seven cases, of which 5 died. Of the fatal cases one had chronic interstitial nephritis, one had mediastinitis, one had acute mitral endocarditis, and one had chronic and acute endocarditis, with hemiplegia. In one case that recovered there were endocarditis and joint pains which did not yield to salicylates.

Endocarditis.—Cases showing endocarditis post-mortem were 5 in number. The lesions found pointed rather to a simple than an infective endocarditis.

Peritonitis.—One case, in which peritonitis was really due to intestinal obstruction.

Otitis.—Two cases. In one of these the membrane was punctured, but no pus found.

Arthritis.—Joint pains occurred in one case. *Cf.* pericarditis.

Thrombosis.—One case. Recovery.

Delirium.—In 31 cases delirium was a marked feature, but 4 of these were alcoholic subjects, 2 of them having delirium tremens. Of these 31 cases, 7 died.

There were no instances of infective endocarditis, meningitis, colitis, or peripheral neuritis.

Treatment by serum or vaccine has not been employed.

FROM WESTMINSTER HOSPITAL, 1897-1906

CONTRIBUTED

By A. M. GOSSAGE, M.B.

PHYSICIAN TO OUT-PATIENTS.

A.

Age period	10—20	20—30	30—40	40—50	50—60	Over 60
Total number	88	67	63	59	31	11
Deaths	3	16	24	25	23	8
Mortality	3·6	24·0	38·0	42·4	74·0	72·7

Number of cases, 309. Number of deaths, 99. Mortality-rate, 31 per cent.
Sex : males, 232 ; females, 87.

COMPLICATIONS.

Empyema.—

Age period	10—20	20—30	30—40	40—50	50—60	Over 60	
Cases	2	3	3	5	2	1	= 16
Deaths	0	2	3	4	2	1	= 12

(Note.—During the same decade there occurred two cases of pneumococcic empyema, proved bacteriologically, where no history of previous pneumonia was obtained. In one of these cases, aged 21, there was also suppurative pericarditis, and in the other, aged 51, suppurative meningitis. Both died.)

Pleural Effusion (Serous).—Paracentesis was required in 2 cases. Both recovered.

Pericarditis.—Cases 14 ; deaths 10.

Abscess of Lung.—Three cases, all fatal. In one case large numbers of pneumococci were found in the consolidated area. One case, aged 50, occurred from breaking down of an infarct.

Gangrene of Lung.—Cases 4, all fatal.

Peritonitis.—In one man, aged 62, who died with lobar pneumonia, there were also empyema and suppurative peritonitis, both probably pneumococcic, though a bacteriological examination was not made.

Meningitis.—Two cases of suppurative meningitis occurred. In one of these there was also pneumococcic empyema, and pneumococci were found in the spleen. Both died.

Colitis.—One case, aged 39 ; recovery.

Chronic Pneumonia.—Two cases ; one died, one was relieved.

Phlebitis.—One case, in a man of 27 ; recovered.

SERUM TREATMENT.

A man, aged 40, received 10 cc. of Wellcome's anti-streptococcic serum (pneumonia) on two occasions while suffering from lobar pneumonia. He recovered.

B.—1897—1906.

CASES UNDER THE AGE OF 10.

Lobar Pneumonia.—Two hundred and forty-six cases and 31 deaths (12·6 per cent.).

	Under 1	1—2	2—5	5—10
	23	46	99	78
Died	8	14	7	2
Percentage	35	30	7	2·5

Broncho-pneumonia.—Four hundred and fifty-two cases and 214 deaths (49·5 per cent.).

	Under 1	1—2	2—5	5—10
	147	136	141	28
Died	102	64	41	7
Percentage	70	44	28	25

A number of these cases should, in my opinion, be included amongst the lobar pneumoniæ.

Empyema after Lobar Pneumonia (whether occurring in the hospital or before admission).—Thirty-six cases and 17 deaths (14·6 per cent. of total cases and 55 per cent. of total deaths).

	Under 1	1—2	2—5	5—10
	4	12	12	8
Died	3	10	3	1
Percentage of cases	17	26	12	10
,, deaths	37	71	43	40

Empyema after Broncho-pneumonia.—Fourteen cases and 12 deaths.

	Under 1	1—2	2—5
	4	6	4
Died	3	6	3

Pneumococcic Empyema without Pneumonia.—Eight cases and 1 death.

	Under 1	1—2	2—5	5—10
	1	2	4	1
Died	0	1	0	0

It is noticeable that empyema was present in 14 out of the 23 cases which died between 1 and 10, and that in 2 others meningitis was present (probably pneumococcal). In 2 other cases between these ages death may be regarded as more or less accidental, since the pneumonia was a complication in one of influenza, and in the other of severe diarrhœa and vomiting.

FROM EAST LONDON HOSPITAL FOR CHILDREN, 1902–1906

CONTRIBUTED

By A. M. Gossage, M.B.

ASSISTANT PHYSICIAN.

Lobar Pneumonia.—Seven hundred and fifty-nine cases and 107 deaths (14 per cent.) ; 443 males and 316 females.

	Under 1	1—2	2—5	5—10	10—20
	95	245	261	139	19
Died	33	41	25	6	2
Percentage	34	16·5	9·6	4·3	10

Broncho-pneumonia.—Five hundred and twenty-six cases and 298 deaths (56 per cent.).

	Under 1	1—2	2—5	5—10
	179	225	117	5
Died	122	114	59	2
Percentage	69	50	50	40

Empyema after Lobar Pneumonia.—Ninety-two cases and 31 deaths, *i.e.*, 12 per cent. of total cases of pneumonia and 29 per cent. of total deaths. This list includes cases of empyema where the initial pneumonia occurred before admission to the hospital.

	Under 1	1—2	2—5	5—10
	7	40	31	15
Died	3	15	10	2
Percentage of total cases of pneumonia	7·3	16	11·5	10·8
,, ,, deaths from ,,	9	39	40	33

In 53 the pneumococcus was found, pure in 51, in 2 in conjunction with staphylococcus. In 3 cases pure cultures of staphylococcus and in 2 of streptococcus were obtained. In 1 a bacillus like the influenza bacillus in a case of empyema, suppurative pericarditis and meningitis. In 3 cases the pus was apparently sterile, but 1 of these was associated with pneumococcic pericarditis. In one case a diplococcus, which was not the pneumococcus, was obtained.

Empyema after Broncho-pneumonia.—Thirty-six cases and 24 deaths.

	Under 1	1—2	2—5
	7	21	8
Died	6	13	5

Sixteen pneumococcic; 3 staphylococcic; 2 streptococcic; 1 a diplococcus which was not the pneumococcus.

Empyema in which no history of Pneumonia could be obtained.—Fifty-two cases and 21 deaths.

	Under 1	1—2	2—5	5—10
	10	17	14	11
Died	8	7	4	2

These were all pure pneumococcic except 1, in which streptococci were found as well, and 1 which contained pneumococci and staphylococci mixed ; 2 cases, where bacteriology of the pleura is unrecorded, were associated 1 with purulent peritonitis and 1 with pneumococcic purulent pericarditis.

Purulent Pericarditis.—Twenty-one cases and 21 deaths.

Under 1	1—2	2—5
3	10	8

Three were primary pneumococcic pericarditis. Nine occurred after lobar pneumonia, 4 were associated with primary pneumococcic empyema and 5 complicated broncho-pneumonia. Twelve were pneumococcic, 1 staphylococcic but associated with pneumococcic empyema, 1 a diplococcus which was not the pneumococcus, and 1, where there was also empyema and meningitis, was apparently due to a bacillus closely resembling the influenza bacillus. In cases of purulent pericarditis there is usually also an empyema, but in 2 cases purulent pericarditis occurred without empyema.

Meningitis.—Twenty-five cases, 25 deaths. One tubercular, 2 post-basic and 1 cerebro-spinal, and 1 acute case was due to the meningococcus after broncho-pneumonia. Of the other 20 cases, 6 were primary pneumococcic without pneumonia, 11 occurred after lobar pneumonia, of which 1 was pneumococcic and in another was a bacillus like the influenza bacillus. Two were associated with empyema and pericarditis and in one with peritonitis. One occurred with a clear serous pleural effusion, three complicated broncho-pneumonia, in one of which there was an empyema. One of these broncho-pneumonia cases gave a pure culture of the pneumococcus. All these cases were under 5 years of age. One child, aged 6, had optic neuritis and head retraction while suffering with lobar pneumonia, but recovered.

Peritonitis.—Fourteen cases, all died. One tubercular. Four primary pneumococcic without pneumonia, all under the age of three months. Two pneumococcic after lobar pneumonia, and 1 pneumococcic with primary pneumococcic empyema. One contained *Bacillus coli* in pure culture and was associated with lobar pneumonia and pneumococcic empyema. Of the other 5 cases, 1 was simple and 4 purulent, 3 were complications of lobar pneumonia, and 1 of broncho-pneumonia, and 1 was associated with an empyema without pneumonia.

Otitis.—Sixty-two cases, 14 deaths. All under 5 years of age. One primary pneumococcic otitis. Twenty-two occurred after lobar pneumonia and 36 after broncho-pneumonia. One was tubercular, associated with tubercular meningitis; 5 were pneumococcic, 1 staphylococcic and 1 sterile, while the others were not examined. Two cases occurred with pneumococcic empyema and 1 with primary pneumococcic pericarditis.

Colitis.—Four cases, all after lobar pneumonia; 20 deaths.

Under 1	2–5	5–10
1	2	1

Chronic Pneumonia.—Twelve cases, 4 after lobar pneumonia and 8 after broncho-pneumonia. No deaths.

Abscess of Lung.—Five cases, all after broncho-pneumonia. All died.

Gangrene of Lung.—No cases.

Pneumococcic Arthritis.—One case in the shoulder-joint of a child, aged 10 months, after a pneumococcic empyema. One case of primary pneumococcic arthritis occurred in a child of 5 months.

Endocarditis.—One case occurred of ulcerative endocarditis (? pneumococcic) after lobar pneumonia, in a child of 4 years who was already suffering from chronic valvular disease.

A peri-articular abscess near the left hip occurred in a case of chronic pneumonia, empyema and pneumococcic peritonitis. During the present year (1907) there has been a case of pneumococcic purulent periostitis after pneumonia.

Clear Serous Effusion in Pleura.—Three cases only required operation or tapping. Two cases in which pneumococci were found in the effusion occurred after lobar pneumonia (1 associated with pneumococcic purulent meningitis) and 1 after broncho-pneumonia, but in none of these did the effusion become purulent. One case of primary serous effusion, without pneumonia, contained pneumococci, and cleared, whilst another subsequently became purulent and required operation.

Of the 72 deaths which occurred between the ages of 1 and 10, 27 were cases complicated by empyema, 6 by meningitis apart from empyema, 1 by purulent pericarditis and 1 by pneumococcic clear serous effusion, *i.e.*, in 50 per cent. of the total number there was one or more of the ordinary complications of pneumonia. In 14 of the remaining cases death was only partly due to the pneumonia, as they were already suffering from such diseases as chronic valvular disease of the heart, diphtheria, pertussis, splenic anæmia, cancrum oris, tubercle and cerebro-spinal meningitis.

SERUM TREATMENT.

One case, aged 1 year and 2 months, of pneumonia and empyema received 10 cc. of anti-pneumococcic serum, but died.

Cases under the age of 10.

FROM WESTMINSTER HOSPITAL & EAST LONDON HOSPITAL FOR CHILDREN.

Lobar Pneumonia.—Nine hundred and eighty-six cases and 136 deaths (13·8 per cent.).

	Under 1	1—2	2—5	5—10
	118	291	360	217
Died	41	55	32	8
Percentage	34	18·8	8·9	3·6

Broncho-pneumonia.—Nine hundred and seventy-eight cases and 512 deaths (52 per cent.).

	Under 1	1—2	2—5	5—10
	326	361	258	33
Died	224	178	100	9
Percentage	70	49	38	27

Empyema after Lobar Pneumonia.—One hundred and twenty-eight cases and 48 deaths (12·7 per cent. of total cases and 35 per cent. of total deaths).

	Under 1	1—2	2—5	5—10
	11	52	43	23
Died	6	25	13	3
Percentage of cases	9·3	17·8	11·9	10·6
,, deaths	14·6	45·5	40·6	37·5

Empyema after Broncho-pneumonia.—Fifty cases and 36 deaths.

	Under 1	1—2	2—5
	11	27	12
Died	9	19	8

Pneumococcic Empyema without Pneumonia.—Sixty cases and 22 deaths.

	Under 1	1—2	2—5	5—10
	11	19	18	12
Died	8	8	4	2

In the 95 deaths between 1 and 10 there were 41 cases of empyema, 8 of meningitis apart from empyema, 1 of purulent pericarditis, and 1 of pneumococcal clear serous effusion. In 16 cases death was only partly due to pneumonia. Out of 79 previously healthy children who died, death was due to pneumococcic complications in 51 cases, or 65 per cent.

Incidence of Empyema after Pneumonia at different Ages.

STATISTICS DRAWN FROM WESTMINSTER AND SHADWELL.

One thousand three hundred and thirty-six cases of pneumonia and 156 cases of empyema (11·6 per cent.). Two hundred and forty-two deaths from pneumonia and 65 deaths after empyema (26·9 per cent. of total deaths).

Under	1	1–2	2–5	5–10	10–20	20–30	30–40	40–50	50–60	Over 60
Cases of empyema	11	52	43	23	2	9	5	6	3	3
Deaths	6	25	13	3	0	2	4	5	3	3
Percentage of total cases of pneumonia	9·3	17·8	11·9	10·6	2·5	12	7	10	9	23
Percentage of total deaths	14·6	45·5	40·6	37·5	—	9	16	19	12	30

FROM ST. GEORGE'S HOSPITAL, 1897—1906.

CONTRIBUTED

By F. L. Golla, M.B.

MEDICAL REGISTRAR.

Year	Number of cases	Male	Per cent.	Female	Per cent.	Deaths	Per cent.	Recoveries	Per cent.
1897	42	35	83·4	7	16·6	12	28·5	30	71·5
1898	31	22	70·9	9	29	9	29	22	70·9
1899	72	65	90·3	7	9·7	16	22·2	56	77·7
1900	71	60	84·6	11	15·4	15	21·1	56	78·8
1901	76	56	73·6	20	26·3	19	24·4	57	75
1902	103	87	84·4	16	15·5	37	35·9	66	64·1
1903	54	44	80·1	10	19·6	11	20·5	43	79·5
1904	62	50	80·6	12	19·3	9	14.2	53	86·4
1905	53	44	82·8	9	17	12	21·1	41	77·9
1906	70	63	90	7	10	15	21	55	78·9
Total	634	526	83	108	17	155	24	479	76

All cases over ten years of age.

COMPLICATIONS.

	Per cent.	Cases	Mortality per cent.	Deaths
Pleural effusion, necessitating tapping	3·9	25	12	3
Empyema	4·1	26	23	6
Gangrene	·3	2	50	1
Abscess	·4	3	33	1
Unresolved pneumonia	·4	4	one died of an intercurrent disease	
Pericarditis	3·9	25	68	17
Endocarditis	·8	5	100	5
Peritonitis	·3	2	nil	0
Otitis	·8	5	20	1
Meningitis	·4	3	100	3
Arthritis	·6	4	25	1
Colitis	·3	2	nil	0
Thrombosis	·3	2	nil	0
Peripheral neuritis	--	No case		

Anti-pneumonic sera, 4 cases, mortality *nil*. Source of serum not indicated in notes. In 1 case known to be supplied by Lister Institute.

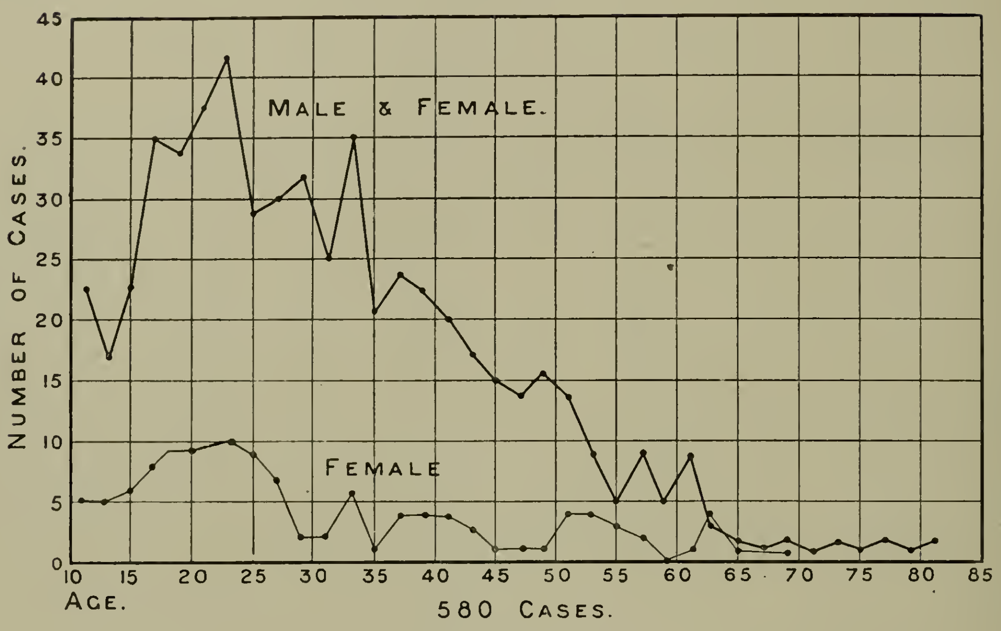
Dr. Latham.—Horse serum injected in 1 case pneumonia. Good recovery. No immediate fall of temperature.

Anti-diphtheritic serum, 2 cases of pneumonia. In 1 case crisis took place immediately after.

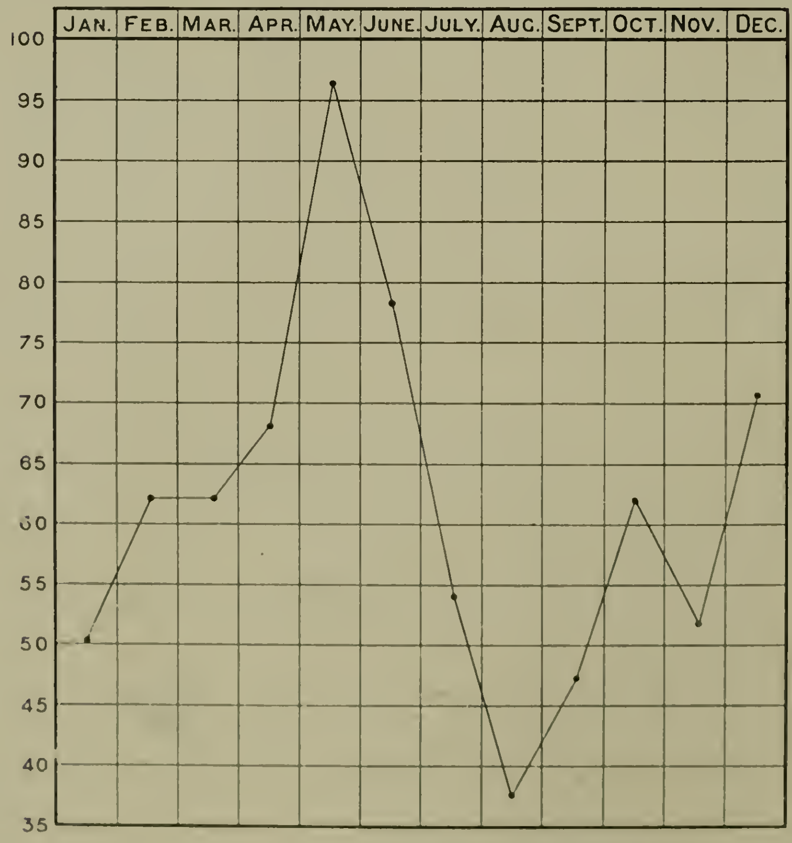
Two cases of broncho-pneumonia treated with anti-diphtheritic serum. In 1 case temperature fell after injection. Both good recovery.

Dr. Rolleston.—One case treated with anti-diphtheritic serum; pneumonia-crisis not apparently accelerated.

CHART SHOWING AGE IN RELATION TO PNEUMONIA.



MONTHLY INCIDENCE. PERIOD OF NINE YEARS, 1898—1906.



FROM ST. MARY'S HOSPITAL, 1896-1905.

CONTRIBUTED

By H. A. Caley, M.D.,

PHYSICIAN TO THE HOSPITAL,

AND

F. S. Langmead, M.D.,

MEDICAL REGISTRAR.

Number of cases	437
Number of deaths	91
Mortality	20·8 per cent.

Age Incidence and Mortality.

	10–20	21–30	31–40	41–50	51–60	+60	Age unknown
Number of cases ...	127	139	73	41	17	12	28
Deaths	11	23	21	14	5	5	9
Percentage mortality	8·6	16·5	28·7	34·1	29·4	41·6	32·2

Sex Incidence and Mortality.

		No. of cases	No. of deaths	Percentage mortality
Total cases ... 437	Males ...	344	76	22·1
	Females ..	93	12	12·9

Complications.

Empyema	cases 18	6 deaths.
Pericarditis	,, 14	13 deaths.
Pleural effusion	,, 8	All recovered.
Gangrene of lung	,, 1	Fatal.
Chronic pneumonia	,, 5	All recovered.
Infective endocarditis	,, 2	Both fatal.
Otitis	,, 1	Recovered.
Digestive complications (including colitis)	,, 3	2 deaths.
Thrombosis	,, 3	1 death.
Arthritis	,, 0	
Neuritis	,, 0	

Note.—Signs of more or less cardiac dilatation were recorded in 192 of the 437 cases.

FROM GUY'S HOSPITAL, 1902–1906.

CONTRIBUTED

By John Fawcett, M.D.,

PHYSICIAN TO THE HOSPITAL,

AND

H. C. C. Mann, M.D., and H. C. Cameron, M.B.,

MEDICAL REGISTRARS.

Number of cases	727	(males 522, females 205)
Number of deaths	114	
Mortality-rate	15·6	per cent

Site of disease	basal	apical	double
Number of cases ...	463	116	35
Number of deaths ...	82	12	19
Mortality-rate ...	17·7	10·3	54·3

Age period ...	1—5	6—10	11—20	21—30	31—40	41—50	51—60	over 60
Number of cases	131	154	174	98	80	56	24	10
Number of deaths	13	4	13	22	23	23	10	6
Mortality-rate	19·9	2·6	7·4	22·0	28·7	41·0	41·6	60·0

COMPLICATIONS.

Serous effusion ...	16 cases;	fatal 1	
Empyema	49 ,,	,, 14	
Gangrene of lung ...	7 ,,	,, 6	
Delayed resolution ...	21 ,,	,, 0	
Pericarditis ...	27 ,,	,, 22	
Endocarditis ...	6 ,,	,, 4	
Peritonitis... ...	5 ,,	,, 5	
Otorrhea	6 ,,	,, 0	
Meningitis... ...	3 ,,	,, 3	
Arthritis	4 ,,	,, 0	
Colitis	6 ,,	,, 3	
Thrombosis or Embolism	2 ,,	,, 1	
Septicæmia ...	8 ,,	,, 6	
Jaundice	3 ,,	,, 0	
Nephritis	13 ,,	,, 5	
Hyperpyrexia ...	50 ,,	,, 13	
Parotitis	1 ,,	,, 0	
Prolonged pyrexia ...	7 ,,	,, 0	
Miscarriage or abortion	4 ,,	,, 2	
Appendicitis ...	2 ,,	,, 0	
Albuminuria ...	109 ,,	,, 27	(This figure is necessarily under the mark.)
Convulsions ...	9 ,,	,, 2	

FROM UNIVERSITY COLLEGE HOSPITAL, 1897—1906.

CONTRIBUTED

By S. A. Owen, M.B.

Number of cases	452 (males, 333; females, 119)
Number of deaths	125
Mortality-rate	27·6 per cent.

COMPLICATIONS.

Serous effusion	11 cases	Nephritis	13 cases
Empyema	20 ,,	Pneumococcal abscess	3 ,,
Gangrene of lung	6 ,,	Diarrhœa	18 ,,
Abscess of lung	4 ,,	Jaundice	4 ,,
Chronic pneumonia	4 ,,	Mediastinitis	2 ,,
Pericarditis	16 ,,	Bronchiectasis	1 ,,
Infective endocarditis	13 ,,	Hæmaturia	1 ,,
Peritonitis	0 ,,	Parotid abscess	1 ,,
Otitis	3 ,,	Tonsillitis	1 ,,
Meningitis	5 ,,	Purpura	3 ,,
Arthritis	12 ,,	Followed by hemiplegia ...	2 ,,
Colitis	0 ,,	Followed by uræmia	1 ,,
Thrombosis	0 ,,	Laryngitis	1 ,,
Peripheral neuritis	0 ,,	Glycosuria	1 ,,

FROM CHARING CROSS HOSPITAL.

CONTRIBUTED

By W. C. Bosanquet, M.D.

ASSISTANT PHYSICIAN.

Age incidence	10—20	21—30	31—40	41—50	51—60	Over 60	Total
Cases	53	65	66	38	9	7	238
Deaths	2	14	21	18	3	5	63
Percentage	3·8	21	32	47	33	71	26

Yearly Cases and Seat of Lesion.

Year	Total cases	Male	Female	Recoveries	Deaths	Right base	Left base	Right apex	Left apex	Double
1897 ...	21	18	3	16	5	11	3	1	1	1
1898 ...	16	12	4	11	5	8	1	2	1	0
1899 ...	40	29	11	29	11	19	11	5	2	3
1900 ...	29	22	7	24	5	12	10	1	1	3
1901 ...	19	17	2	10	9	6	8	0	1	3
1902 ...	33	24	9	26	7	10	11	3	1	5
1903 ...	16	11	5	12	4	5	6	1	1	1
1904 ...	17	13	4	14	3	7	5	1	0	2
1905 ...	25	17	8	21	6	5	6	3	2	3
1906 ...	22	18	4	14	8	10	2	0	0	1
	238	181	57	177	63	93	63	17	10	22

Complications.

Pleural effusion	is recorded in 13 cases	...	Never required tapping.
Pericarditis	,, 11 ,,	...	3 recovered and 8 died.
Endocardial murmurs	,, 3 ,,		
Acute nephritis	,, 1 ,,	...	Fatal.
Chronic tubal nephritis	,, 1 ,,	...	Fatal.
Chronic interstitial nephritis ...	,, 2 ,,	...	1 recovered and 1 died.
Albuminuria (more than a trace)	,, 5 ,,	...	3 recovered and 2 died.
Empyema	,, 3 ,,	...	All fatal.
Gangrene of lung	,, 1 ,,	...	Recovered.
Abscess of lung	,, 1 ,,		
Glycosuria	,, 1 ,,	...	Fatal.
Acetonuria (no sugar)	,, 1 ,,	...	Fatal.
Phlebitis	,, 2 ,,		
Jaundice	,, 1 ,,	...	Recovered.
Peritonitis	,, 2 ,,	...	1 recovered and 1 died.
Abdominal pain and distension...	,, 4 ,,		
Spinal meningitis	,, 1 ,,	...	Fatal.
Recurrence or relapse	,, 2 ,,		
Diarrhœa	,, 11 ,,	...	5 recovered and 6 died.

Suppurative conditions with which pneumonia was associated were septic phlebitis, cellulitis of face with antral disease, and cellulitis of arm, and in two instances it followed parturition. In one instance there was evidence of infection, several cases occurring in one place of business.

Medical Section.

November 26, 1907.

Dr. Gee, President of the Section, in the Chair.

The Pathology of Epilepsy.

By Alfred E. Russell, M.D.

In about 50 per cent. of epileptics a family history of epilepsy or insanity is found (Gowers). In other words, a condition of the nervous system is inherited which easily determines the development of epileptic fits. After the disease is well established, certain changes in the brain are recognisable, but it is open to doubt whether such changes are not in the main secondary.

Whether or not in the earlier stages of epilepsy there is any demonstrable abnormality in the nervous system (cerebro-spinal and sympathetic), we have to endeavour to explain the extraordinary fact that, without a moment's warning, an attack of unconsciousness associated with the most extreme muscular contractions, and followed by more or less prolonged coma, may develop. It is important to note that the very first fit may be a most severe one.

An interference with consciousness and a disturbance of the musculature so sudden and appalling suggest a catastrophe in the brain equally sudden and of the gravest magnitude.

Among the many conditions which are apt to be associated with fits indistinguishable from those of idiopathic epilepsy we may enumerate the following:—

(1) Very severe hæmorrhage.
(2) Various infantile conditions.
(3) Eclampsia.
(4) Organic brain disease.
(5) Experimental local stimulation of cortex by electric current.
(6) Uræmia.
(7) Various poisons, such as lead, and noticeably absinthe.

The striking difference between the fits that may occur in some of the above affections and those of idiopathic epilepsy is that they do not of necessity tend to recur and recur over a long period of years in the manner characteristic of epilepsy.

Now in most of the above-mentioned conditions the fits are, or may be, at times indistinguishable from those of the idiopathic disease, and it would be singular indeed if such a variety of causes could produce the truly remarkable series of events known as an epileptic fit, unless through the intervention of some factor common to all.

In this paper it is submitted that the theory that a sudden failure of the cerebral circulation is the immediate factor in the genesis of epileptic and many other convulsive fits is worthy of re-consideration.

THE ASSOCIATION OF SYNCOPAL AND CONVULSIVE SEIZURES WITH BRADYCARDIA AND OTHER CARDIAC AFFECTIONS.

It is well known that in cases of Stokes-Adams disease (heart-block), &c., cessation of the heart-beat for more than a few seconds is associated with transient unconsciousness, with or without convulsive movements. The following cases have been selected from the literature as being of value in this connection, and they will be followed by evidence of failure of the cerebral circulation in epilepsy itself.

Bristowe [1] quotes the case of a man, aged 31, an ex-soldier, who had suffered from syphilis and ague. Without going into details, it may be said that he was suffering from fits associated with an exceedingly slow pulse, sometimes not more than 26 per minute. The fits always came on at the end of an unusually long interval between successive cardiac beats; "while the pulse was at the rate of one beat in three seconds, or even four seconds, no fit occurred, but whenever, and only when, the intermission was prolonged to five seconds, a fit followed at the end of that period." The fits "vary in length, but insensibility only lasts for a few seconds. He becomes very pale before each fit, then flushes, and while insensible his hands twitch a little." "That the epileptic seizures came on only at the end of a cessation of the pulse for five seconds was repeatedly verified, and not only by the finger on the radial artery, but also by listening to the sounds of the heart." The man had a loud apical systolic murmur.

Dr. A. T. Gibbings [2] records the case of a man, aged 66, with very slow pulse dropping as low as twelve per minute, with still more marked convulsions. "The face became deadly pale, the pupils dilated and the eyes fixed; the pulse ceased to be felt at the wrist. After a few seconds it returned feebly; the face then flushed all over, and clonic convulsive tremors lasted for five or six seconds. The first indication of the attack was the non-recurrence of the usual pulse beat. He generally had an aura consisting in a feeling of hot fluid at the back of the neck."

R. F. Benham [3] records the case of a woman who, at the age of 65, had several fits one morning, and "while I was enquiring into their nature with two fingers on her radial pulse, the latter suddenly stopped, she became blanched, the eyes fixed and unconscious, and general tonico-clonic spasms occurred which lasted for about fifteen seconds. About fifteen similar attacks occurred over a period of two and a half hours, and I was able to predict each by the sudden stoppage, as it were, not only of the radial and carotid pulses, but also by the arrest of the heart's action when in complete diastole.

Alfred Webster [4] reports the case of a man, aged 48:—

"From the sphygmographic tracings it was seen that there were long intervals during which no pulse was appreciable at the wrist. These intervals sometimes lasted for ten or fifteen seconds. If the finger were kept on the pulse, the following facts were observed and noted in order of their appearance: First the pulse became suspended; then, and almost at the same moment, the face became rapidly and extremely pale. If the period of absence of the radial pulse were only of short duration, say of four or five seconds, there was a general *crescendo* return of the pulse and a coincident flushing of the face. During these short pauses the patient appeared to be merely sleeping. Frequently, however, the period lasted much longer—ten, fifteen and twenty seconds elapsing between the pulse beats. During this time, commencing with the disappearance of the pulse, the pallor of the face became more and more marked; later on, however (perhaps after some fifteen seconds of absence of pulse), spasmodic twitchings of the face were observed; then as the period lengthened the spasmodic movements extended to the muscles of the neck, frequently carrying the head to one or other side, and ultimately the arms and legs took part in the convulsive movement. Flushing of the face and the return to consciousness were always almost simultaneous with the appearance of the pulse at the radial artery, the pulse being felt slightly before the flushing of the face was observed. Auscultation over the præcordium during these pauses discovered what appeared to be abortive beats of the heart, but these beats were not appreciable to the finger at the radial pulse, or indeed in any of the superficial arteries."

Webster's paper is accompanied by a series of sixty beautiful sphygmographic tracings from his case, which establish beyond question that the arrest of the pulse preceded the epileptiform attack.

Dr. George Murray [5], in his Bradshaw Lecture on Exophthalmic

Goître, describes the case of a young woman, aged 22, whom he was treating with the preparation of dried milk of thyroidectomised goats, known as "rodagen." Whether the result of the rodagen or not, she developed sudden cardiac failure with bradycardia, and one day, "between 7.20 and 11 a.m., she had numerous attacks, in each of which the heart, which was, as already described, beating slowly, would stop altogether for several seconds; a convulsion then took place, which lasted two or three seconds. The patient was conscious at the onset of the convulsion, but lost consciousness for a second or two at the end of it. One or two of these attacks occurred while I was auscultating the heart, and the long period of asystole was remarkable; the slow pulse was irregular at the time. After 11 a.m. she had no return of the attacks."

These seizures vary in severity from a transient dazed feeling to a momentary unconsciousness and to severe convulsions.

A very good example is recorded by Hay and Moore [6] in which the convulsive movements "varied from slight twitching movements and rigidity to a *severe general convulsion.*" In their case the periods of ventricular asystole were at times as long as seventy-five seconds. The convulsive movements always came on towards the end of the seizure.

Another most instructive case was recorded last year by Finny [7]. The patient was a woman, aged 42, who suffered from bradycardia and arrhythmia of the heart from April, 1904, to March, 1906. Without entering into any details as to the cardiac condition, it may be stated that the pulse-rate was, as a rule, between 21 and 28 per minute. At varying intervals, however, the rate changed, and a state of pulselessness lasting from five to fifteen seconds supervened. During these latter periods certain fits or, as she described them, "weak turns," developed. Frequent observations determined the fact that the fits were not simply due to the infrequency of the pulse, for they did not occur while the pulse-rate was as slow as 18 or 20 per minute, but that they were sure to occur when pauses of eight to ten or fifteen seconds were observed, and that they occurred towards the end of the period of cardiac asystole. Dr. Finny gives the following description of the fits:—

"A 'weak turn' was ushered in and preceded by a delay in the heart's beat and radial pulse. Thus, when a pause lasted seven to ten seconds the patient's face became pale, the eyes had a very pained and frightened look, and some little restlessness of the head and hands ensued; and it ended by a slight flushing of the cheeks, some tears in the eyes, and the patient would give a slight sigh, or little hem or cough, and the weakness would be over. The 'slight fit' came on with a soreness or sharp feeling in the stomach and left side of the thorax, which would then extend up the right side of the chest into the head and eyes. The pallor of the face would be more marked, the eyes would turn up to the right side, and the hands would fidget and the fingers catch at the sheets. The patient always came out of this fit in a more frightened and slightly dazed manner, and the eyes had a strained and somewhat blind look for some minutes. The 'severe fit' was more distinctly epileptic, with sudden onset, the patient falling back if sitting up in bed, great pallor, convulsive movements of hands and arms. and also slightly so of feet, unconsciousness for five or ten seconds, and then great flushing of the face, and the patient came out of it very confused, and she was dull and nervous the whole day following. She never bit her tongue or passed urine in them."

Other cases could be quoted, but the above are enough to justify the statement that cessation of the heart for a limited number of seconds is associated with transient loss of consciousness which may be absolutely indistinguishable from *petit mal* (indeed Finny regarded and treated his patient for such on first seeing the case), and that with more prolonged cardiac arrest definite convulsive seizures are brought about, which attacks again may be practically indistinguishable from those of major epilepsy.

In such cases of heart-block, moreover, the cardiac arrest is the result of heart disease. That the unconsciousness and convulsions in these cases are directly dependent upon a primary failure of the cardiac contraction, and therefore of the cerebral circulation, is obvious.

If evidence is forthcoming that in idiopathic epilepsy a comparable failure of the cerebral circulation occurs, the evidence will be strong that, as in the cases above recorded, the relation between the circulatory failure and the fits will be one of cause and effect. Such a sudden failure in the cerebral circulation might be due to a sudden cardiac inhibition or to a sudden vaso-motor spasm in the cerebral arteries. We will consider both possibilities.

Evidence of Cardiac Arrest in Idiopathic Epilepsy.

Moxon [8], when examining a patient with cardiac dropsy, notes :—

"I was feeling his pulse carefully ; the beats were regular and of moderate strength. . . . I missed one, then another beat, and then found the pulse to have stopped so entirely that it made me look up suddenly at the man to see what was the matter. His face had become very pale, his head was turned towards his left shoulder, and the lip and cheek were twitching ; the spasms then affected his arms, and he passed into a severe epileptic convulsion.

> At the time when I first noticed the pulse to disappear the man's arm was quite still. I tried to feel the pulse during the convulsion, but there was so much muscular movement that I could not distinguish it."

On another occasion Moxon was examining the pulse of a man who had been admitted to hospital for uræmic vomiting and convulsions :—

> "I took his wrist and felt his pulse ; it was forcible and regular. I was feeling it when it disappeared from under my finger, many beats being missed. I looked at him ; he had become very pale in the face, twitching set in, and he at once went into a very severe epileptic convulsion."

Moxon's house physician, Mr. Lane, corroborated the same fact twice on the same patient. Moxon noted a third example in an epileptic :—

> "I was examining the heart of a young gentleman who was asking my advice on account of attacks of epilepsy. He was standing and I had my stethoscope over his heart and was attending to the quality of the sounds. These sounds stopped suddenly and so completely that in great surprise I moved to look at him, and saw him with exceedingly pale face, evidently quite unconscious, his balance just lost and he falling forwards. He forthwith went into severe epileptiform convulsions."

At the conclusion of his lecture Dr. Southey informed Moxon that, in the only instance in which he had his finger on the pulse at the beginning of an epileptic convulsion, he observed the pulse to disappear during the onset of the attack. Moxon further remarks that "I have found the pulse present again when the clonic spasms have just commenced." He attributed the cessation of the heart to the action of the pneumogastric nerve, but recognised the fact that the cause of this pneumogastric impulse was yet to seek. Hilton Fagge [9] records a similar case. He was listening to the heart of an epileptic when it ceased to beat and the man fell back. Presently it recommenced to beat, and then there was a little twitching of his hands.

The writer [10] has recorded a similar case coming under his own observation, and another communicated to him :—

> "The patient, C. T., was a man, aged 21. He had suffered from epileptic fits all his life. A maternal aunt had also been subject to fits all her life. The patient's fits commenced with an aura which was referred to by him as an indescribable sensation in his navel. The majority of his fits occurred in bed at night ; sometimes in his waking moments. Any emotional excitement was very apt to precipitate a fit. On April 21 he developed a fit in the out-patient room. He uttered a cry and was seen to be rubbing his hands together. His pulse was immediately examined for, but was not palpable. He was just commencing the stage of tonic spasm when the wrist was seized. This tonic spasm

lasted for about three-quarters of a minute, perhaps a minute. Dr. E. W. Hedley, who examined the other wrist, also corroborates the absence of the pulse during the tonic phase. It was not easy to determine exactly when the pulse returned, but we feel certain that the pulse did not return until the clonic phase. At first it was feeble, but as the fit subsided it became fuller and stronger. Dr. W. T. Harris, of Chiswick, has kindly told me of another case which occurred in his practice. A man came to have a tooth extracted. While applying the forceps the patient's head suddenly fell back, and his face turned exceedingly pale. On feeling for his pulse Dr. Harris found it to be absent. Thinking that it was a severe syncopal attack, he attempted to give the patient some sal-volatile, but clonic convulsions intervened. These were slight and very transient, consciousness being regained almost immediately. Within a few minutes, however, the patient again turned very pale and became unconscious with tonic spasm. Dr. Harris again noted complete absence of the radial pulse, but at the commencement of the clonic stage a feeble pulse appeared at the wrist, which gradually improved as the fit subsided. On questioning the patient, he acknowledged having had two previous epileptic fits."

The peculiar significance of this case lies in the fact that the complete absence of the pulse and the patient's extreme pallor led Dr. Harris to believe that it was a fatal attack of syncope.

In another case a girl, A. L., aged 12, was subject to both major and minor attacks, the latter being described as attacks of giddiness. She has suffered from epilepsy since the age of 6. On one occasion I was feeling her pulse. She was telling me of her state during the past fortnight 'and was saying that she was that day feeling perfectly well. She was not nervous at the time, but suddenly the pulse stopped, she gave a short cry, clutched at my coat, and sat down in a chair by which she had been standing. She did not lose consciousness. The cardiac arrest was of very short duration, probably about five seconds, and the heart then began to beat again, but the pulse was extremely feeble for a few contractions, perhaps from fifteen to twenty, and then rapidly increased in force so that within about half a minute from its reappearance it had regained its previous state. A few minutes later its rate was 124, a rate very common in this particular case. The above attack was a typical example of many of her minor seizures. She herself complained of giddiness and thought she was going to have a fit, as this sensation usually preceded a major attack, though an accompanying aura, a feeling of a desire to micturate, was absent. The child is always much frightened by these attacks.

Here was a case of cardiac inhibition in what might be called *petit mal*, but which I think would be more accurately described as an incomplete or abortive major attack. The cessation of pulse and the child's cry were, I think, simultaneous. Moxon [8] quotes Hughlings Jackson's observations of the disappearance of the pulse at the onset of attacks of *petit mal* on several occasions. But cardiac inhibition is certainly not necessary for the production of *petit mal.* I was on two occasions feeling the pulse of a boy subject to these attacks when one supervened. No arrest occurred, nor was there any obvious change in the pulse-rate, though I was inclined to think that the tension was increased during the attack.

A transient spasm of the cerebral arteries might underlie these attacks. In the case of the boy just mentioned, he was unaware of his attacks, whereas the girl recognised them and dreaded them very much; but they are clearly cases of very different type. It is not contended that complete cardiac arrest occurs in every epileptic convulsion, for it is stated that the pulse may persist throughout a fit, but an extreme feebleness, short of absolute cessation, might be sufficient to initiate a fit. The following case, for example, which occurred under the author's own observation, might well be described as a fainting fit but for collateral evidence.

The patient, T. A., was a youth, aged 20. He came to hospital having had a "fit" the previous day. He had had only one fit previously, twelve months ago. His facies was typically epileptic. He attended hospital for three weeks, and during that time had one more attack. On his last attendance he complained of pain over a sebaceous cyst situated over his right mastoid process. His pulse was 74 per minute, but was small and rather feeble. He flinched on examination of the sebaceous cyst, turned very pale, and rolled back in the chair unconscious. His pulse was found to be extremely feeble. There were no spasms whatever and the unconsciousness lasted for about a minute, when he gradually regained his senses. This attack could only be called a faint. In two or three minutes, however, he again turned pale and fell back, but with this difference, that there were several clonic spasms of his face and one spasm in his arms. His pulse was under examination when he rolled back, and it became so feeble during the period of unconsciousness as only to be detected with considerable difficulty. He was stupid for a few minutes and then recovered. After the attack was over his pulse was still very feeble, but on examination with the sphygmomanometer the blood-pressure was found to be 120 mm. of mercury.

Nobody seeing the boy and the second attack could doubt its epileptic nature, and at the same time the alteration in the pulse in both attacks left little room for doubt but that it was the precipitating factor both of the "faint" and of the "fit."

SYNCOPAL ATTACKS.

It is admitted that an attack of syncope is due to cardio-vascular derangement associated with a diminution in the blood flow through the brain. The development of unconsciousness is, as a rule, gradual; the patient feels faint, turns pale, and then may recover or lapse gently into unconsciousness. The pathological condition underlying such an attack is one of lowered blood-pressure produced by inhibition of the heart and vaso-motor centre, with vaso-dilatation of the splanchnic area. When this has reached a certain degree the cerebral blood supply is so diminished that consciousness can no longer be maintained. Concomitant with the splanchnic vaso-dilatation the heart-beat becomes extremely feeble and the radial pulse may be almost imperceptible. The pulse-rate appears to vary, in some cases being quickened, whilst in others it is slowed. The normal physiological accompaniment to a fall in blood-pressure is for the heart-rate to be increased, apparently a conservative effort to raise the blood-pressure.

The sinking feeling at the pit of the stomach, which is so common an event as the result of some sudden and unexpected noise or other stimulus, is probably a sudden dilatation of the splanchnic vessels, and if severe enough would, no doubt, be associated with a sudden loss of consciousness, for it is very noticeable that the so-called faint may be very gradual in onset, or of rapid onset and even sudden. Sir William Gowers [11] has recorded cases in which repeated syncopal attacks have passed into minor epilepsy. One case is as follows:—

> "A girl, when about 7 years old, became liable to faint on any sudden start or alarm. The faints had all the characters of cardiac syncope; there were pallor, coldness, and gradual loss of consciousness. After some years such faints occurred without exciting cause, and became more sudden in onset. When she was 17 years old one of these attacks passed into a distinct epileptic fit, with deviation of the head, general clonic spasm, and micturition during the attack."

Several such are recorded, and in all the same phenomena were presented; attacks originally brought on by external influences, and typically syncopal, after a lapse of time appeared spontaneously and with a more sudden onset—in fact, became undoubtedly epileptic.

In his comments on these most interesting cases Gowers remarks that—

> "These cases present strong evidence of the influence of repeated cardiac syncope in disposing to epilepsy. They suggest that the state of the nerve elements that underlies the loss of consciousness in syncope may, by repeated induction, acquire a tendency to spontaneous development, which constitutes minor epilepsy."

Gowers assumes that unconsciousness in syncope is not due primarily to the cardiac failure, but to some state of the nerve elements thereby induced, and that in the above cases it is this state of the nerve elements, admittedly brought on at first by cardiac inhibition, which tends to reproduce itself spontaneously.

The explanation I would suggest for the above cases is that it was the hypersensitive vaso-motor and cardio-regulatory apparatus (hypersensitive as shown by the ease with which a true faint could be induced) which gradually acquired the tendency to spontaneous development of those cardiac and vascular changes which precipitated the faint, and that this spontaneity, with increased rapidity of onset, was the cause of the change in the appearance of the attacks.

As above remarked, the onset of a faint may be gradual; sometimes, however, it is rapid, and may be so sudden as to produce a severe fall. It would seem probable that in such attacks very complete cardiac inhibition takes place, of course of very temporary duration. It is a notable fact that under the influence of severe shock cardiac inhibition may be complete, with sudden death. These more severe and sudden attacks correspond more closely to epileptic fits, and the correspondence is all the closer inasmuch as muscular spasm is not uncommon in such attacks.

Patients not infrequently give a history of having had an isolated fit or faint, the nature of which is usually a matter very difficult to decide. On the hypothesis under discussion such attacks are epileptic in nature, in that the pathology of the attack is the same, viz., a sudden failure of the cerebral circulation from cardiac inhibition, but that the patient is nevertheless not an epileptic, in that the necessary conditions which determine the tendency to recurrence of the fits are not present.

As has been said, a severe faint may be attended with muscular spasm. On the other hand, the period of unconsciousness of an epileptic fit may be devoid of muscular spasm. Thus, in the case of a patient of my own, a boy, aged 14, the aura consists of a tingling of hands which spreads up the arms, a tingling of feet spreading up the legs, abdominal pain, and headache. These aural symptoms may last for some minutes, and are succeded by a fall and unconsciousness, or rather modified consciousness. The boy lies quiet, with no spasms of any sort; his face is pale, with a grey colour round the mouth. If spoken to, he is able to answer with difficulty. His mother has had three fits herself; her brother and her sister's daughter are confirmed epileptics. She has had, therefore, a considerable experience of genuine epileptic fits, and her description of the boy's attacks was clear and precise, yet their epileptic origin is scarcely open to doubt. I do not know what is the condition of the pulse in his attacks.

THE CAUSATION OF CARDIAC INHIBITION IN EPILEPSY.

Moxon attributed the cardiac arrest in his cases to a vagus inhibition of the heart. Francis Hare, in his recent work, upholds the theory of cerebral anæmia as being the pathological factor producing the epileptic fit, and propounds the following statement as representing the sequence of events in the genesis of a fit:—

> "I shall assume provisionally that in epilepsy, as in most of the paroxysmal neuroses, there is an initial widespread area of vaso-constriction tending to cause a rise in the general blood-pressure; that this vaso-constriction, whether because it is sudden or because it is very extensive, leaves no time or room for adequate compensation by an area of vaso-dilatation; and that, consequently, cardiac inhibition through the vagus is demanded to check the continuous rise in the general blood-pressure so induced. So is occasioned a grave modification of the heart-beat, of the nature of slowing and weakening, amounting perhaps quite often to actual cessation. In this way are produced a more or less sudden fall in the blood-pressure and a more or less sudden anæmia of the brain, and this is the proximate factor of the unconsciousness and of the convulsions. Synchronous with the initial rise of blood-pressure are the various premonitory symptoms or auræ of the fit; synchronous with the sudden fall of blood-pressure is the commencement of the unconsciousness and of the tonic muscular spasm; synchronous with the recommencing or accelerating heart-beats, and the consequent progressive recovery of the blood-pressure, is the relaxation of the tonic spasm and its substitution by intermittent or clonic convulsions, presenting progressively widening intervals. As the blood-pressure continues to rise, the clonic convulsions become less and less frequent, and finally cease."

There is no doubt that *in epilepsy the vaso-motor system is remarkably unstable.* I have been repeatedly struck by the pulse irregularities present in epileptic patients. In some the pulse-rate is, as a rule, very considerably increased, and yet on other less frequent occasions is abnormally slow. Not only that, but the pulse frequently shows wide variations in the course of a few minutes. In one patient I have seen time after time the pulse so feeble and small that she might, on the evidence of the pulse alone, have been in a state of severe collapse. The volume and pressure also vary very considerably. These variations are just as well marked in old cases inured to hospital as in new ones in whom the pulse might be affected directly as the result of their visit to a hospital. These irregularities are much in excess of those noticeable in patients suffering from other ailments, and must represent a very abnormal vaso-motor regulation. It is probably not unfair to assume that the cerebral circulation in epileptics shows similar variations.

Spratling [13] notes that:—

> "In 284 cases in which the pulse-beat was noted it was found to run uniformly above the normal in 189,—64 per cent. In 20 cases it was below 70; in 74 cases from 70 to 80; in 161 cases from 80 to 100; while in the remaining 29 cases it was 100 or over. It was counted in every instance during the interparoxysmal period, the patient being entirely free from any immediate epileptic influence."

In an examination of 33 cases to determine the blood-pressure as near to the convulsive period as possible and as remote from the same period as possible, Spratling found an apparent decrease in the blood-pressure just before the convulsive period in 11 cases, and an increase in 21 at the same period, the latter being somewhat more marked in degree than the former. The rapid rise in blood-pressure postulated by Hare might be very transient, and, unless the blood-pressure were under observation at the moment preceding the onset of the fit, would be most difficult of demonstration and even of observation. The sensation of chilliness which sometimes precedes a fit is presumably to be attributed to cutaneous vaso-constriction. If, however, constriction should occur in other regions—the splanchnic area, for instance, or in a large muscular area—the result would be the same, viz., either a compensating vaso-dilatation elsewhere or of necessity a rise in the general blood-pressure. If, instead of the heart responding to this rise in blood-pressure by the customary increased force of beat, its vagus mechanism were too sensitive, or its protecting depressor nerve mechanism at fault, the result might be cardiac inhibition with resulting cessation of the heart, or a marked enfeeblement short of actual cessation, followed by unconsciousness, and, if of more than the most transient duration, would result in the production of convulsions, *i.e.*, an epileptic fit.

Dr. F. H. Clarke [13A], in a paper on "Epileptoid Attacks in Tachycardia and Bradycardia," quotes Langendorff's observations on the results of stimulation of the peripheral end of the vagus in rabbits narcotised with chloral: "Electrical stimulation of the peripheral end of the vagus causes a prolonged stoppage of the heart, with a very remarkable phenomenon, never hitherto observed, so far as we know—a complete epileptic convulsion occurs ten or fifteen seconds after the diastolic pause. . . . Precisely similar convulsions are produced by compression of the thoracic aorta at a point nearer the heart than where the great vessels are given off to the head."

It has often been observed that during any pyrexial condition there may be either a marked diminution in the number of epileptic fits or even a total cessation. Fever may produce this result by reason of the peripheral vaso-dilatation and lowered blood-pressure so commonly associated with it. The success of the old-fashioned method of treatment of epilepsy by a seton might be due to the vaso-dilatation determined by the mild sepsis. Such vaso-dilatation would be an obstacle in the way of the rise of blood-pressure above postulated.

It is well known that an inhalation of amyl nitrite in the stage of aura will sometimes completely prevent the further development of the fit. It was observed in the case associated with cardiac arrest which I recorded above. Its mode of action could account for the non-delevopment of the fit, whether we consider cardiac inhibition or vaso-motor spasm of cerebral vessels to be the immediate excitant. In the first case, on the assumption that the cardiac inhibition is secondary to a sudden rise in blood-pressure due to a widespread vaso-constriction, the action of the drug in producing a sudden fall of blood-pressure by the induction of a general vaso-dilatation would remove the factor responsible for the reflex cardiac inhibition, and in the second case the fact that amyl nitrite has a peculiarly well-marked action on the cerebral vessels would fully explain its power of averting the march of events.

VAGAL AND VASO-VAGAL ATTACKS.

That vaso-motor and vagal symptoms may be prominent features in epileptics is well illustrated in a most interesting paper by Sir William Gowers [14] under the title "Vagal and Vaso-vagal Attacks." A series of 11 cases is described, which I think afford great support to the view that the manifestations of epilepsy depend upon abnormal working of the great vagal and vaso-motor systems. The vagal symptoms were chiefly sensations referred to the stomach, the respiratory system and the heart. The epigastric sensations were those of oppression, or of fulness, or were indescribable. They began suddenly: a sense of sudden stoppage of the heart followed by rapid action, often a sense of impending death. A peculiar slight mental state was common; it was generally described as a difficulty or slowness of mental operations, a difficulty in thinking or in concentrating attention. These also always began suddenly. A sense of sudden fatigue was a common initial symptom. The vaso-motor symptoms sometimes attained a high degree, coldness of skin was common, and the pulse became small at the same time. Pallor of face and shivering were common, and sometimes amounted to a definite rigor. With the coldness of the extremities, tingling and numbness in them were often described, and sometimes slight tetanoid spasm occurred. Migraine was not uncommon in these cases.

In one case (Case 2), a man, aged 30, had suffered from attacks for twelve years. Quite suddenly a dreamy mental state would occur. This was not momentary, as in epilepsy, but persisted. With it, or just after its commencement, his hands and feet became cold, his face increasingly pale, and muscular weakness was extreme, so that if he tried to sit up he fell back at once. His extremities became icily cold, even to an observer; his pulse became smaller and smaller until hardly perceptible. Consciousness was retained throughout, and he felt as if dying. This state lasted half an hour, and then he became aware that his mental state was improving, and that his feet were a little less cold. Within two or three minutes a distinct rigor set in, lasting a couple of minutes, and coincident with gradually increasing warmth. He continued pale for the rest of the day. A few minutes after the rigor an urgent need for micturition was felt, and went on during the rest of the day, a large quantity of limpid urine being passed.

These symptoms may, I think, be interpreted as follows: An initial widespread cutaneous vaso-constriction is obvious. The dreamy mental state probably represents the fact that the cerebral vessels participated in the spasm. Gowers suggests that the muscular enfeeblement might be due to cerebral vaso-constriction, but it might also be aided by a vaso-constriction of the muscular area. The bulk of the blood presumably found its way into the splanchnic area, as is suggested by the copious diuresis which occurred, and by the extreme feebleness of the pulse. The condition of the pulse further suggests that the sum total of the blood-pressure was a marked lowering, despite the cutaneous vaso-constriction, which would tend to a rise of blood-pressure.

If the vaso-motor symptoms had been a little more severe, and at the same time of only momentary duration, the attack would have been one of *petit mal*. It is probable that intermediate cases occur in which the relationship to *petit mal* is still more obvious.

In another case (Case 8) a woman was subject to attacks in which a sudden sense of fatigue was followed by yawning, several times repeated, and then loss of consciousness for a second or two, after which she was well; *petit mal* in fact. But she did not always thus lose consciousness; sometimes the yawning was followed by a sense of suffocation and cardiac distress, and she felt that unless she kept perfectly still she would faint. The sense of suffocation would continue for one or even two hours, but at any moment might be ended by a moment's loss of consciousness. Gowers points out that the brief attacks were clearly epileptic, but that in the longer ones prolonged vagal symptoms (respiratory and cardiac distress) were interposed, "as if symptoms usually momentary, as the aura of epilepsy, became protracted, extended, as it were, into a vagal attack." But the exact nature of the respiratory and cardiac distress is not clear. To properly appreciate them would necessitate the opportunity of witnessing them, of taking observations on the pulse and blood-pressure, &c. A widespread vaso-constriction such as was common in Gowers' cases would lead, in the absence of a compensating dilatation in other regions, to increased strain on the heart. Under ordinary circumstances the heart protects itself against too great a rise of blood-pressure by means of an afferent impulse passing up the depressor nerve, which brings about a reflex vaso-dilatation, especially in the splanchnic region. If this mechanism were at fault it is readily conceivable that cardiac distress should result.

In another case (Case 9) a woman, aged 35, had attacks in which a sudden intense sense of suffocation, with a feeling of tightness in the head, was followed after a minute or so by a moment's complete loss of consciousness. On its return she felt cold, first and foremost in her extremities. The coldness was so intense that it made her shiver. After about ten minutes she burst into perspiration, and simultaneously her heart began to beat violently, and the symptoms slowly subsided.

In this case the loss of consciousness was interposed between the initial symptoms and the vaso-motor symptoms, and so on with the other cases, some of which are clearly epileptic. In a similar case of my own, in a man aged 42, a sensation described as of a ball of air rising from the stomach into the throat is succeeded by a feeling of collapse, and sometimes loss of consciousness (*petit mal*). Usually, however, the sensation is succeeded by a feeling of numbness of legs, which may become quite cold, and a coldness and numbness of fingers. The condition in the fingers is evidently closely allied to, if not identical with, Raynaud's disease, as they have at times become "as blue as a dark blue serge suit." This numbness and coldness of legs may last for two or three hours.

Such cases are doubtless much commoner than is suspected, and their slowness of development renders them more easily accessible to examination. In all, the prolonged symptoms were of the kind which, if momentary, would be described as typical epileptic auræ. At the same time many of them were obviously vaso-motor or cardiac in origin, and that this is recognisable is due to the fact that they were exceedingly deliberate in onset instead of momentary, as is suggested for epilepsy in its ordinary manifestations.

Gowers remarks himself that "velocity is an essential element of ordinary epilepsy, but this does not preclude the possibility of deliberation in attacks not far removed from epilepsy."

I submit that these are epileptic attacks, in which deliberation is *substituted* for velocity.

ON VASO-MOTOR SPASM IN THE BRAIN AS A CAUSE OF EPILEPSY.

This theory of the method of production of cerebral anæmia as the cause of epilepsy has had many adherents. Hallager's monograph upholding this view gives a full historical retrospect [15]. If, as this paper is written to maintain, epilepsy is due to a sudden failure of the cerebral circulation, then vaso-motor spasm of the cerebral arteries, if intense enough, could certainly act as an adequate excitant of a fit. Direct demonstration of such as the excitant would obviously be very difficult, but if it can be proved that such vaso-motor activity does occur, the possibility of such being concerned in the genesis of fits would be established. Until recently it was held that there was no evidence of vaso-motor activity in the cerebral vessels, but the recent demonstration of a copious network of nerve fibres to the cerebral blood-vessels demands a revision of the position.

Harvey Cushing [16] notes that, "contrary to the positive statements of many, substances like epinephrin will blanch the pial vessels over the area of its application, as will occasionally a jet of cold water against the brain or the faradic current used for cortical stimulation."

Raynaud's Disease.—Other evidence of the presence of cerebral vaso-motor activity is gained from a study of the phenomena of Raynaud's disease. The most feasible explanation of this condition is that the paroxysms are due to attacks of extreme vaso-constriction occurring in the affected parts. Certain cerebral complications occasionally occur in the course of the attacks which would be readily explicable on the supposition of a concomitant constriction of the cerebral arteries. Thus Osler [17] records the case of a woman, aged 48, who was subject to the ordinary symptoms of Raynaud's disease, but in addition she had three attacks of aphasia with partial right hemiplegia and one of left-sided weakness, occurring with the attack of peripheral Raynaud's disease. The facts that these attacks were transient, that in each case they were followed by perfect recovery, and that they occurred concurrently with attacks of peripheral constriction strongly suggest that they were due to spasm of cerebral arteries. A similar case is recorded by Weiss [18]. The patient was a woman, aged 35, who suffered from repeated attacks of Raynaud's disease with gangrene, and, in addition, from various other manifestations, such as sensory disturbances, trophic disturbances in skin, acute atrophy of the left half of the face, &c. She had, however, two attacks of great interest in this connection. They commenced suddenly. "The patient became pale, her lips were blue, and the retinal arteries were narrowed to a striking degree. She had difficulty in finding familiar words, and she transposed words or syllables, and used wrong ones. Voluntary movement was not affected in this seizure. The attack was at an end in fifteen or twenty minutes, speech being quite restored. A similar attack occurred four weeks afterwards." Weiss attributed the condition to a spastic ischæmia of the speech centre.

That the retinal artery may be narrowed with impairment of vision is well known to occur in Raynaud's disease. Such phenomena strongly favour the view that the cerebral arteries, like those in other situations, are subject to variations in their calibre. It is very interesting, moreover, to note that Raynaud's disease is apt to be associated with epileptic fits, and, indeed, Monro [19] states that 5 per cent. of the cases of Raynaud's disease have suffered from convulsions at some time or other, and several very striking cases of the association are on record. Thomas and Osler [20] record the case of a man whose attacks of Raynaud's disease were associated with severe epileptic attacks. The sequence of events was as follows: Firstly, the fingers became cold, white and dead, and the nails blue, associated with considerable pain. Then followed general chilliness, with cold feet. These premonitory symptoms lasted for five minutes, and were succeeded by unconsciousness and convulsions lasting for half an hour. In this case there was, firstly, the arterial spasm leading to the local syncope of the fingers; and, secondly, general chilliness, probably to be attributed to a general cutaneous vaso-constriction.

If, as a result, a rise of blood-pressure occurred, it would, on Hare's hypothesis, be the factor determining the vagus inhibition of the heart. The convulsions might also be explained by a vaso-constriction affecting the cerebral vessels, the occurrence of which in cases of Raynaud's disease has been suggested above. Other cases illustrating the association of epilepsy and Raynaud's disease are also on record.

Migraine.—The association of epilepsy with migraine is of considerable interest. It occasionally happens that periodical attacks of migraine are replaced by ordinary epilepsy, the migraine then ceasing. In migraine there is undoubted evidence of abnormal vaso-motor action. Chilliness of the skin is common; the temporal artery on the affected side is often contracted and hard. Relief of the pain often attends compression of the carotid artery. This, and the fact that the pain in the head is of a throbbing character, suggest that the old explanation of a vaso-dilatation of the cerebral vessels is correct. Such a dilatation of the vessels, with resultant increased tension of the dura, &c., would be enough to account for the pain. The brain tissue itself is insensitive, and Harvey Cushing has noted that after excision of the Gasserian ganglion any subsequent headache is only felt on the side with the intact fifth nerve, an observation which indicates that intracranial pain is experienced *via* the fifth nerve. The dilatation can, moreover, be seen. Thus Mollendorff [21] points out that "during the attacks the background of the eye on the suffering side was of a bright scarlet red, the optic papilla red and œdematous, the arteria and vena centralis retinæ enlarged, the latter knotty and very tortuous." There is much to be said for the view that the symptoms of migraine depend upon abnormal vaso-motor activity, and that the headache is the result of vaso-dilatation. Gowers records the following unique case: In brief, the patient was a girl, aged 16, who had been subject to periodical attacks of migraine since the age of five years. At 13½ she had an epileptic fit during sleep, and since then three others, two during sleep and one when awake. Since the first fit the headaches had been frequent, but were preceded by a brief but very definite visual aura. The interesting point is that the single epileptic fit which occurred when she was awake was preceded by precisely the same aura. An interpretation that is possible for this case is that the local vaso-constriction responsible for the premonitory visual manifestation was succeeded by a local vaso-dilatation in the attacks of migraine, and either by a more severe and widespread cerebral vaso-constriction or by cardiac inhibition in the epileptic attack.

PETIT MAL.

A consideration of the cerebral phenomena attending cases of bradycardia, heart-block, &c., shows us that the attacks present an increasing degree of severity proportional to the length of the period of asystole. There may be merely a transient giddiness, a dazed feeling, a "turn"; or the head may drop forward momentarily, the patient recovering himself immediately; or unconsciousness may be rather deeper though still transient; or a fall with slight spasm; or, finally, a severe general convulsion. Every one of these phases could be duplicated among the numerous manifestations of minor and major epilepsy. And when we compare the gradually increasing severity of the manifestations, according to the length of the period of cardiac asystole, with the phenomena of epilepsy, the resemblance is more than suggestive.

Discussing the types and degrees of seizures, Aldren Turner [22] remarks that—

> ". . . The primary types of epileptic attacks denote consecutive stages of the same series of phenomena—stages which may be arrested at any period."

Among various examples given by Turner is the following:—

> "A common form of incomplete attack is seen in fits, the aura of which is a feeling of giddiness followed by a sudden fall from loss of consciousness, but without convulsion. In these cases there are commonly found attacks of giddiness (aura), as well as complete seizures, in which the fall is followed by the usual convulsive phenomena of a major fit."

In other words, the stages of severity observed are, firstly, an attack of giddiness only; secondly, an attack of giddiness followed by a fall from loss of consciousness; and finally the complete fit, terminating in convulsions.

Again, in Finny's case of bradycardia recorded above, the attacks varied from what were called "weak turns" to "slight fits" and "severe fits." The case was at first regarded as one of *petit mal*. It is very interesting to note that the slight fits came on with soreness or sharp feeling in the stomach and left side of the thorax, which would then extend up to the right side of the chest into the head and eyes—a definite aura in fact. Finally, in the severe fit the onset was more sudden, there were convulsive movements of limbs, and the patient came out of it very confused and was dull and nervous the whole day following. To say that resemblances such as these are accidental is scarcely sufficient. It is difficult to conceive of any other explanation than an identity of cause. But it cannot be claimed that cardiac inhibition occurs in all cases of minor epilepsy. I have myself observed the pulse to continue apparently unchanged throughout an attack on two occasions. On the other hand, Moxon [8] stated that Dr. Hughlings Jackson informed him that he had observed on several occasions the pulse to disappear during the paleness of the face in the onset of attacks of *petit mal.* The explanation may perhaps be sought in the possibility of a cerebral vaso-motor spasm underlying some of the attacks of *petit mal*, and considerable evidence has been brought forward as to such possibility. In other words, whilst the fundamental pathology of *petit mal*, viz., a diminished blood-supply to the brain, holds good, there may be two ways in which it can be brought about: cardiac inhibition and cerebral vaso-motor spasm. In the first case the cardiac inhibition might be very slight and transient, with merely a dulling of consciousness, or more severe but momentary, in which case the minor attack would be represented by a fall; if of still longer duration the more fully developed fit would occur. In other words, cardiac inhibition of varying duration would explain the fact that the epileptic fit shows so many stages of development.

INFANTILE CONVULSIONS.

The similarity between infantile convulsions and those of idiopathic epilepsy is so close that the probability of the same factor underlying the two conditions must be very considerable. The vaso-motor system of the child is much more unstable than that of the adult, and the ease with which emotional disturbance and shock are produced is notorious. In a considerable number of cases the occurrence of apparently ordinary infantile convulsions is the starting point of chronic epilepsy. In other words, of the enormous numbers of children affected with infantile convulsions, some become chronic epileptics while others do not. There is nothing in the type of the fits which enables us to determine whether chronic epilepsy is likely to follow or not. Only the subsequent history determines this.

It seems hardly open to doubt but that the large numbers of alleged causes of infantile convulsions, such as teething, rickets, worms, acute infections, gastro-intestinal disturbance, fright, and so on, must exert their influence *via* some common factor. Such a factor might be, as suggested, abnormal vaso-motor and cardio-motor systems with a ready liability to attacks of vagus inhibition. If this factor is brought into play once only, we have an isolated convulsion; if only a few times, we have a few convulsions. If, however, it is brought into action over and over again, chronic epilepsy is the result.

Children are more susceptible to fear than adults. Discussing the effects of fright, J. R. Charles [23] remarks that:—

"As regards the vaso-motor apparatus, there is widespread vaso-motor constriction of the cutaneous area, with a feeling of chilliness, shivering, and goose-skin. At the same time there is probably a corresponding vaso-dilatation of some of the internal vessels, as evidenced by the copious secretion of urine, the so-called nervous urine in which the water is increased out of all proportion to the solid constituents, and also by diarrhœa. As a rule, the heart beats quickly and violently, but if the impression is very sudden and intense there may be *complete arrest of the heart's action.* There is frequently a spasm of some of the involuntary muscles, leading to involuntary micturition and less frequently defæcation, and a feeling of oppression and constriction in the chest, possibly due to contraction of the bronchial muscles. . . . Tremor is so common that the verb 'to tremble' has become almost synonymous with the verb 'to fear.' . . . More rarely the muscles may become rigid, or be *thrown into convulsive movements during moments of great terror.* . . . It will be noticed that there are certain points of analogy between the bodily effects of fright and those of cold, viz., the cold surface from vaso-motor constriction, the goose-skin, erection of hair, polyuria, tendency to diarrhœa, and tremor."

Speaking of the influence of mental emotion as an excitant of epilepsy, Gowers [24] states:—

"Of all the immediate causes of epilepsy the most potent are psychical—fright, excitement, anxiety. To these were ascribed more than one-third of those in which a definite cause was given. Of the three forms of emotion, fright takes the first place. The relation of this cause to age is, however, very distinct. It is effective chiefly in early life, when emotion is so readily excited, and is most powerful at the transition from childhood to adult life, while after middle life it is almost inactive. . . . The female sex is notoriously the more emotional, and accordingly the disease results from fright in a larger proportion of females than of males. . . . It is also notorious that this difference between the sexes increases as life advances. In childhood one sex is almost as emotional as the other, but with puberty men become far less emotional than women. The influence of fright as a cause of epilepsy is in strict harmony with this fact. Under 10 years of age, the sexes suffer equally. Between 10 and 20, the males suffer less than females, as 3 to 4; between 20 and 30 as 3 to 13; and over 30 the only cases due to this cause occurred in women."

There is little room for doubt that fright exerts a great influence on the cardiac and vaso-motor systems, and that a severe fright can cause a transient stoppage of the heart. Death has even been known to occur under such circumstances. When we further reflect on the above remarks on the influence of fright in producing epilepsy, the evidence points strongly in the direction that the convulsions of infancy must depend on an affection of the cardiac and vaso-motor systems, and that the immediate factor in the attack is either a cardiac arrest or a cardiac failure so severe as to give rise to rapid failure in the cerebral circulation.

The convulsions met with at the onset of acute infections in childhood are worthy of discussion. Under similar conditions rigors are common in the adult, so much so that it is almost an aphorism that under such conditions a convulsion in a child is the equivalent of a rigor in an adult. I have, however, once seen a convulsion at the onset of pneumonia in a non-epileptic adult.

A rigor is associated with marked cutaneous vaso-constriction with pallor and sensation of chilliness. The sensitive cardiac and vaso-motor systems of the child may not be able to compensate for the rise of blood-pressure thereby induced, and it is to be noted that the old-established method of cutting short convulsions in infancy by means of immersion in a warm bath produces a vaso-dilatation of the skin.

ON CEREBRAL INTRAVASCULAR CLOTTING AS THE CAUSE OF EPILEPSY.

According to John Turner [25], "Epilepsy is a disease occurring in persons with a defectively developed nervous system, associated with a morbid condition of the blood, whereby it shows a special tendency to intravascular clotting, and that the immediate cause of the fits is sudden stasis of the blood-stream resulting from the blocking of cerebral vessels by these intravascular clots." He further describes certain changes in the nerve-cells and the retention of subcortical nerve-cells. In answer to the obvious objection that these clots are the results of the fit, Turner points out that "clots may occur in great quantity in those who have had no fits for a long time before death." But this fact equally bears the interpretation that such clots do not therefore of necessity produce an epileptic fit.

It is difficult to conceive that a process of intravascular clotting could produce an epileptic fit, unless it were extremely widespread, in which case the subsequent destruction of brain tissue would be so great as to be incompatible with the undoubted fact that after a fit the epileptic shows so little material change, mental or physical. It is not until after a very large number of fits that the epileptic, as a rule, becomes so markedly degraded. If, on the other hand, the clotting is very localised, it is equally difficult to conceive how it brings about the extraordinary phenomena of a fit. This applies especially to the sudden loss of consciousness. Why should the blocking of a few small capillaries result in sudden unconsciousness? If I may put it this way, the brain is very tenacious of its attribute consciousness, and a process of intravascular clotting which in its very essence leads to atrophy of brain substance is not likely to produce so extraordinary a phenomenon as sudden unconsciousness followed by an appalling disturbance of the general musculature, when it has been of so slight a degreee as to lead to no subsequent detectable paralysis. I maintain that consciousness is not lost suddenly unless as the result of a very gross lesion. Nothing short of a severe injury or of gross interference with the circulation through the brain will produce it. It is difficult also to see why, on this hypothesis, the recovery from a fit is so rapid and so absolute.

If, on the other hand, we consider the hypothesis of *a sudden cessation (or extreme enfeeblement) of the whole cerebral circulation,* the difficulties disappear. Unconsciousness *must* occur. The phenomena of bradycardia show that, in proportion as the period of cardiac asystole increases, we have varying degrees of cerebral failure, attacks indistinguishable from those of *petit mal,* attacks with very transient spasm, and, finally, definite epileptic fits. Inasmuch as it has been shown that in some cases of idiopathic epilepsy, cardiac inhibition does occur, and precedes the onset of the fit, it is difficult to avoid the conclusion that the fit is the result of the cardiac inhibition, and that the latter is not a mere concomitant of the former.

THE CORRELATION BETWEEN THE CIRCULATORY CHANGES POSTULATED AS THE PRECIPITATING FACTOR IN THE EPILEPTIC FIT AND THE VARIOUS SYMPTOMS OF, AND THE RECOVERY FROM, THE ATTACK.

For any theory of the mechanism of the epileptic fit to rest on a sound basis, it is necessary that it should offer a reasonable explanation of, or at least not to be inconsistent with, the various manifestations observed in the attacks. It is submitted that the circulatory failure above postulated does offer a more reasonable explanation than any hypothesis yet brought forward.

(1) *The Aura.*—Hare [26] maintains that the above-mentioned peripheral vascular changes afford an explanation of the auræ preceding a fit: "The vascular changes, occurring as they do synchronously with the rise of blood-pressure, offer a reasonable explanation of the epileptic as they do of the migrainous, asthmatic, anginal and other auræ.

Some of the vascular changes may be peripheral and constrictive. Fagge [27] says: 'The patient perhaps experiences a sensation of coldness or weight in the limb; and the part is found on examination to be pale and cold to the touch, and to have its sensibility distinctly blunted'. Others of the vascular changes may be peripheral and dilative. Trousseau [28] says: 'A local determination of blood may occur in the finger, for instance, causing it to swell, reddening the skin, and rendering it successively within a very short time red and of a more or less deep violet colour. . . . The swelling is real not apparent, for rings previously easy suddenly become too tight for the fingers.' Or again vascular dilatation and vascular constriction may alternate. Trousseau says: 'The skin may become excessively pale after having been injected for some time.' But many auræ are unassociated with appreciable objective changes in the part whence they seem to arise. Then it is not unnatural to believe that invisible vascular changes, similar in character to the visible peripheral vascular changes just described, are taking place in the cerebral centres and are the immediately responsible factors. On this view we can understand many of the auræ of the special senses observable also in migraine."

That a partial cerebral anæmia is capable of giving rise to the phenomena of an epileptic aura has been demonstrated experimentally by Leonard Hill [29], who says: "I myself have twice produced clonic spasms in myself by compression of one carotid. The first effect on applying the compression was a *sensation in the eye on the same side; then there followed a sensory march of formication down the opposite side of the body. This began in the fingers, spread up the arm, then down the leg.* Finally clonic spasms of the hand occurred, accompanied by an intense feeling of vertigo and alarm."

(2) *Unconsciousness.*—In the absence of an aura (and it is noteworthy that it is frequently absent), the first feature in an epileptic fit is sudden loss of consciousness. So sudden may it be that the patient falls with the utmost violence. Current views on the pathology of epilepsy afford no satisfactory explanation of this. Yet so dramatic a feature should be susceptible of some simple explanation. The loss of consciousness is not caused by the convulsions. It precedes them in point of time, and in tetanus and strychnine poisoning the spasms may be every whit as severe as those of idiopathic epilepsy, but are not attended with unconsciousness. Now one of the most obvious causes, if not almost the only one, of sudden unconsciousness (excluding severe cranial injuries) is a sudden interference with the flow of blood to the brain. Indeed it is

scarcely possible to conceive of anything producing so extraordinarily dramatic and serious a symptom as sudden unconsciousness in a person who at the time may appear to be in normal health other than some sudden vascular or mechanical change in the brain.

It is noteworthy, also, that sudden occlusion of one large cerebra artery by an embolus produces sudden unconsciousness. A complete cessation of the entire cerebral circulation following upon cardiac inhibition would be obviously a still more potent cause.

(3) *Convulsions.*—The classical experiments of Kussmaul and Tenner prove the intimate relationship existing between a sudden cerebral anæmia and the production of convulsions. Their experiments were, moreover, not masked by the administration of anæsthetics. It is also well known that severe hæmorrhage in man can give rise to the most typical epileptic fit. This is not often seen nowadays, when, as Osler remarks, "the reproach of Van Helmont that 'a bloody Moloch presides in the chairs of medicine' cannot be brought against this generation of physicians"; but in past times, when physicians seem to have modelled their practice on the methods of Dr. Sangrado—so satirised by Le Sage in the pages of "Gil Blas"—it was not uncommonly seen; indeed, Marshall Hall [30] remarks that "convulsion is, after syncope, the most familiar of the immediate effects of loss of blood."

The Mechanism of Tonic Spasm.—This is a problem of great difficulty. Spasticity of muscles is observed in lesions affecting the pyramidal tract, and is accounted for by over-action of the spinal cord when the inhibitory influence of the brain is removed. In an epileptic fit tonic spasm appears with great suddenness. On the hypothesis of a sudden failure of the cerebral circulation it might be attributed to a removal of the inhibition influence of the brain (possibly allied to the decerebrate rigidity described by Sherrington in animals with transection of forebrain), or it might be due to irritation of the grey matter by lack of oxygen and excess of carbonic acid.

Inasmuch as it has been clearly shown that cessation of the heartbeats for a limited time can unquestionably be associated with convulsions, it might be supposed that such should be seen at every death-bed; but in the majority of cases death is a gradual process, the circulation failing by degrees, and both the nutrition and irritability of the brain slowly diminishing together, so that any sudden manifestation of spasm would hardly be expected to occur. It might be different in cases of sudden death, but unfortunately descriptions of the phenomena attending sudden death in man are very scanty and imperfect.

It is well known that sudden death may occur during puncture of lung for suspected pleural effusion and during the washing out of empyema cavities. In a paper published by the author on this subject, 3 cases of death occurring during or after exploratory puncture of lung are recorded [31]. In the first case the insertion of the exploring needle was immediately followed by death from cardiac failure, and the point of interest in this connection is that it was accompanied by tonic extensor spasm of arms and convergent squint. The condition of the legs was not observed, but it is probable that they shared in the spasm.

Dr. C. R. Box [32] records the case of a man, aged 50, with cellulitis of leg, who suddenly "without warning had a convulsive fit, became cyanosed and suffered with intense dyspnœa. The pulse became rapid and feeble, and death ensued fifteen minutes from the commencement of the seizure." At the autopsy "a large clot was found coiled up in the main trunk of the pulmonary artery, effectually blocking it. . . . The supposition was that it had formed gradually in the pulmonary trunk and right ventricle, and then, its cardiac end becoming detached, had become impacted in the pulmonary stem." It is to be noted that such an event occurring in the main trunk of the pulmonary artery would, if the clot completely obstructed the lumen of the vessel, bring the entire circulation to a very speedy if not an abrupt end.

The above cases show the results attending a sudden cessation of the entire cerebral circulation. The symptoms attending the sudden cessation of blood-flow through a more limited portion of the brain can be observed very well in cases of embolism of a large cerebral artery. In thrombosis the brain has frequently had time to adapt itself to a diminishing flow of blood and to develop, to some degree, a collateral circulation; but in embolism the results are sudden, and it is notorious that the unconsciousness is sudden in the majority of such cases, and that it is frequently accompanied by convulsions.

Clonic Spasms.—In the case of sudden death above recorded after exploratory puncture of lung, only tonic spasm was observed. The change from tonic to clonic spasms in an ordinary epileptic fit is of great interest. Long Fox [33], who attributed the loss of consciousness and the tonic spasm to cerebral vaso-constriction, ascribed the clonic convulsion to a "gradual yielding of the vaso-motor constriction, allowing at first more blood to enter the arteries than during the period of tonic spasm, but yet far less than is necessary for controlled movement or for rest." Hare also ascribes the clonic convulsions to a recommencement or acceleration of the heart-beats, with a resulting increase in the cerebral blood-flow. In this connection a case recorded by Walter Broadbent [34] is of great importance. The patient was a lady, aged 44, who had suffered from rheumatic fever in childhood, and showed symptoms of cardiac disease. For seven years she had been subject to epileptic fits. One evening, when talking to her daughter, she suddenly became unable to speak plainly, and became rigid preparatory to a fit. The daughter stated that, instead of the usual fit, there was irregular jerking confined to the right arm and leg; the mouth was drawn over to the right, the head turned to the left. The left arm and leg remained absolutely passive. She passed urine in the fit. She was unconscious for five days after the fit. She then showed complete hemiplegia, hemianæsthesia, and hemianalgesia. Movements and sensations were normal on the right side. Death occurred on the ninth day.

Post Mortem.—In the right middle cerebral artery, just beyond the point of origin, a small embolus was found with a distal thrombus for half an inch. The cortex along the course of the vessel was softened; on section, the right corpus striatum and all the surrounding parts, including a portion of the frontal lobe, were in a state of extreme softening.

The importance of this case lies in the fact that the patient was the subject of epilepsy, so that we know that bilateral convulsions would have occurred in the absence of the embolus. But the embolus prevented the return of the blood to the right half of the brain, and clonic movements were absent from the contralateral side.

(4) *The Physiological Mechanism underlying Recovery from an Epileptic Fit.*—Whatever be the immediate factor precipitating an epileptic fit, it is one which is very transient in its action, and speedily recovered from. It is one moreover, which is obviously capable of being brought into action repeatedly. In epilepsy of long duration the patient exhibits a very marked mental degradation, but the effect produced by each fit is imperceptible. Quite apart from the effect produced on the brain by the repeated attacks of cerebral anæmia here postulated as the essential factor of the fit, the intense venous engorgement resulting from the convulsive movements and the asphyxial character of the blood would presumably inflict considerable damage on the brain substance, damage, moreover, repeated over and over again. It would not appear unreasonable to assume that the slight morbid changes described in the brains of epileptics are the results merely of these cumulative lesions. Nothing is more striking than the com-

pleteness of recovery from an epileptic fit. Whatever the cause, it seems to pass away absolutely. On the supposition that the fit is due to a sudden cerebral anæmia, produced by cardiac inhibition, recovery follows on return of the circulation.

It might be urged that, if the fits are due to cardiac inhibition, it should occasionally happen that the heart should stop permanently, and that death in a fit should be, at any rate, not uncommon. If the stimulus producing the inhibition be sufficiently intense, death would doubtless result, as in the case of sudden death recorded above on exploratory puncture of the lung. But though experimental stimulation of the vagus nerve with very powerful stimulus does rarely produce permanent arrest of the heart, it is a fundamental physiological fact that there is a practically irresistible tendency for the heart to recommence beating, even during the stimulation—the so-called *vagus escape of the heart.* This vagus escape of the heart is submitted as a feasible explanation of the recovery from the fits in those cases which are associated with actual cardiac inhibition, whilst in those dependent upon cerebral arterial spasm the fit would subside with the disappearance of the spasm.

(5) *Post-epileptic Coma and Sleep.*—Though recovery may be very rapid after a mild fit, there is commonly observed after the cessation of the convulsive movements a period during which the patient is comatose, a period frequently followed by natural sleep varying in duration. On the hypothesis of a sudden failure of the cerebral circulation, there has been a profound though temporary disturbance of the nutrition of the whole nervous system. As the result there has been an intense discharge of the motor cells. The sensory side of the brain has doubtless been the site of an equally severe disturbance, the earliest sign of which is sudden unconsciousness; but inasmuch as consciousness is requisite for the recognition of sensory disturbances, the presence of such is of necessity masked. Yet the sensory apparatus would presumably be affected equally profoundly with the motor, so that marked exhaustion of the sensory elements, with resulting coma and sleep, is only to be expected.

JACKSONIAN CONVULSIONS.

Local stimulation of the cerebral cortex by the electric current, or by the presence of a cortical tumour, are both competent to produce that type of convulsive seizure commonly known as Jacksonian. The muscles first involved in the convulsive movements are those related to the area stimulated, but the spasms rapidly spread to other groups, and finally the whole musculature of the body may be involved. Consciousness is not always lost in these fits, and if lost, only late in the course of the fit. The spread of the convulsion to muscles other than those related to the area stimulated indicates that a progressively increasing area of cortex becomes involved. Several possible explanations of this march of events must be considered.

(1) It might be due to a spread of the current; but if so one would expect that the spread should occur at the moment of application of the current, and, moreover, the fact that areas very remote from the one primarily stimulated are involved, for instance the opposite side of the brain, renders such an explanation very improbable.

(2) To a spread of the excitation, the view commonly held. That the area of musculature involved in the convulsive movements gradually widens is proof that the excitation spreads, but it affords no explanation as to *how* it spreads.

(3) It might be due to a spreading vaso-constriction of the cerebral blood-vessels, the resulting anæmia bringing about the spread of the convulsions. I have referred above to evidence suggesting that the cerebral vaso-motor mechanism is a much more active one than is generally assumed, and I would draw attention again to Harvey Cushing's observation that faradic stimulation of the cortex can produce a paling of the grey matter. It might be urged that if this were of common occurrence it should have often been observed, but it might easily be overlooked, for slight paling of a surface is not a very obvious alteration.

Sir Victor Horsley [35] was on one occasion operating on the cortex when the patient had an epileptic fit. He noted that the cortex became distinctly *hyperæmic* during the attack. This it would do as the result of the convulsions forcing blood upwards through the great veins of the neck into the brain. The increasing venosity of the blood would also deepen the colour of the cortex, and moreover attention would in all probability not be drawn to the matter until the convulsions began, when hyperæmia would occur almost immediately.

The phenomena of Jacksonian fits dependent on tumour might be susceptible of the same explanation, viz., a spreading vaso-constriction; but it is certainly difficult to correlate this group of fits and those due to absinthe with cerebral anæmia, and the possibility that they depend on a different mechanism must be admitted.

URÆMIA.

Uræmic convulsions may be absolutely indistinguishable from those of idiopathic epilepsy, and if it can be shown that there is evidence of a condition of cerebral anæmia in uræmia, support would be lent to the similar theory as applied to epilepsy. In a paper read before the West London Medico-Chirurgical Society I brought forward evidence to show that the cerebral manifestations of uræmia are due to cerebral anæmia produced by an increase of intracranial tension, resulting in all probability from cerebral œdema [36]. The following is a short abstract of the paper :—

The experimental results following increased intracranial tension were first considered. Harvey Cushing [37] increased intracranial tension in dogs by trephining and applying pressure to the surface of the brain by means of a distensible rubber bag or by means of a cannula screwed into the cerebro-spinal space and connected with a pressure bottle containing normal saline, communicating with a burette containing mercury. He showed that, if the intracranial pressure be rapidly increased, "Kussmaul-Tenner spasms, evacuation of bladder and rectum, practical cessation of respiration, and pronounced vagus effect upon the heart, often with a complete standstill, lasting from ten to twenty seconds, may develop. Then follows a release from this extreme vagus inhibition and the vaso-motor centre exerts its influence." With a slower increase of the intracranial pressure a different series of events occurred. The pressure against the brain could be increased to the point of its equalling the blood-pressure before any symptoms referable to the centres in the medulla were called forth. Direct examination of the cortex through a circular disc of glass fitting tightly into a second trephine hole showed, at this period of equalisation of blood-pressure and intracranial tension, an *abrupt blanching* of the exposed convolutions. The pulsating arteries could be seen against the blanched background and the dark blue veins in the sulci remained filled with blood, but presumably little, if any, circulation passed between them. The usual consequence was not death *but a stimulation of the vaso-motor centre, which occasioned a rise in blood-pressure sufficient to overcome the high intracranial tension;* the cerebral circulation was re-established, and the rosy colour could be seen through the glass window in the trephine hole to return again to the blanched convolution. With further increase in intracranial tension the blood-pressure rose *pari passu*, and always to a point exceeding the intracranial tension. This process could be repeated until the arterial pressure was forced to two or three times its normal level, sometimes to as much as 250 mm. Hg., without evidence of vaso-motor failure. In face of these experiments Cushing's conclusion that an intracranial tension occasions a rise of blood-pressure, which tends to find a level slightly above that of the pressure exerted against the medulla, seems absolutely justified. By this mechanism the vital centres in the medulla and the life of the brain and entire animal are protected.

Secondly, certain clinical conditions associated with an increase of intracranial tension were considered. It is well established that many of the symptoms of cerebral tumour, hydrocephalus, cerebral hæmorrhage, &c., are dependent upon an increase of the intracranial tension. Among such symptoms may be mentioned headache, vomiting, coma, convulsions, choked disc, &c. Extraordinary relief to these symptoms is attained after the pressure is relieved by surgical intervention. An admirable series of cases has been recorded by Harvey Cushing [38].

In another paper Cushing [39] gives the records of five cases of intracranial hæmorrhage, four traumatic and one apoplectic. These illustrate, from the clinical standpoint, the facts ascertained by him experimentally. In one case of apoplectic cerebral hæmorrhage the blood-pressure before operation registered 300 mm. Hg., whilst after trephining and the evacuation of blood it began to fall at once, and in twenty minutes had reached the normal.

The clinical evidence as obtained, therefore, from cases of cerebral tumour, cerebral hæmorrhage, &c., is in complete accord with the conclusions arrived at experimentally by Harvey Cushing. To recapitulate, it is clear that a rise in intracranial tension produced by the introduction of any foreign element, such as a tumour mass, blood, &c., must tend to diminish the blood-flow through the brain. As the tension increases, a point would be reached at which the intracranial tension equals that of the general blood-pressure. The cerebral circulation would therefore cease, were it not that by a compensatory process the general blood-pressure rises to a point above that of the intracranial pressure, and thereby maintains the flow of blood through the brain. But with a great increase of intracranial tension certain general effects are produced, apart from focal symptoms, dependent upon the position of the lesion. Headache, for instance, is common, and is probably attributable to tension of dura mater and tentorial structures.

Optic neuritis is to be attributed, in the main, to a passive venous congestion of the retinal veins, and subsides or improves on relief of intracranial tension, sometimes with extraordinary rapidity.

Finally, coma is almost invariable in the last stages of cerebral tumour and in large cerebral hæmorrhages. Convulsions are also frequent in these conditions. Both are remarkably improved by methods capable of lowering the cerebral pressure, such as trephining or lumbar puncture. And it is to be noted that, by lowering the intracranial tension, a free access of blood to the brain is facilitated.

Uræmia.—In cerebral uræmia we frequently see a symptom-complex almost identical with that of cerebral compression, viz., headache, vomiting, drowsiness, coma, convulsions, optic neuritis, &c. This symptom-complex is, at any rate in great measure, dependent upon increased intracranial tension, for many cases are now on record in which extraordinary relief has followed lumbar puncture, a procedure which, by means of allowing some of the fluid to escape, diminishes the pressure within the cerebro-spinal space. Numerous cases of uræmia were quoted from the literature in which marked relief had followed on the lowering of intracranial tension by means of removal of cerebro-spinal fluid by lumbar puncture. I will only quote here Willson's cases as a type. In two papers he records 10 cases [40]. Of the 10 cases, 6 had convulsive movements, general in 5 and unilateral in 1. *In every case the convulsions terminated on the withdrawal of the cerebro-spinal fluid*, and in only one did they return within several weeks of the operation. His best results were obtained in those cases in which the fluid spurted from the cannula, *i.e.*, in which the pressure was greatest. In the autopsies of fatal cases (3 out of the 10) increased cerebro-spinal fluid, dilated ventricles, and œdema of the brain were found. A sufficient number of cases were quoted to show that marked relief may follow lumbar puncture in cases of uræmia. It is well known that uræmic convulsions and coma may disappear apart from such treatment, but the promptitude with which the improvement occurred was such as to leave no doubt in the minds of the observers that the relation was one of cause and effect. It is noteworthy also that in most of the cases the cerebro-spinal fluid did escape under considerable pressure.

The cerebro-spinal space is a practically closed-in cavity, with walls of considerable rigidity. This cavity is always full of fluid or semi-fluid substance, and to force more fluid into such a space would necessitate great pressure, were it not that by compression of blood-vessels the volume of blood contained in the cranium can be diminished. But after a certain point the peripheral blood-pressure rises and further accumulation of fluid would meet with rapidly increasing resistance, and a small additional quantity would materially raise the cerebro-spinal pressure; *vice versâ,* the removal of a very small quantity could materially lower it.

But relief has not always attended the performance of lumbar puncture in uræmia, and this may be due to the fact that the cerebral pressure is relieved by removal of the *free* cerebro-spinal fluid. If, however, the pressure is mainly produced by a cerebral œdema, then, unless a co-existent excess of free ventricular fluid was present, the removal of the little that would flow might not be sufficient to relieve the pressure materially.

The manifestations of uræmia here considered, which are so strikingly relieved by lumbar puncture, are, as has been pointed out, so closely similar to the pressure symptoms produced in other conditions, such as cerebral tumour, cerebral hæmorrhage, &c., that uræmia has not infrequently been erroneously diagnosed as cerebral tumour, and the fact that the cerebro-spinal fluid is often under considerable pressure in these cases of uræmia indicates that the underlying condition of increased intracranial tension must be responsible for the symptoms.

Harvey Cushing, indeed, makes this suggestion in the paper on the establishment of cerebral hernia above referred to: "I have come to believe that the same causes must underlie the choked disc of tumour and the so-called retinitis associated with renal disease. It seems not improbable that an increase of intracranial tension due to cerebral œdema may be responsible for the occasional retinal changes in Bright's disease, as well as for the headache and vomiting which may characterise it."

URÆMIC COMA.

The foregoing facts indicate that in uræmia a state of increased intracranial tension is induced which gives rise to headache, vomiting, optic neuritis, &c. Concurrently with this the blood-pressure rises and we see the slow, tense pulse so common in uræmia, particularly in its earlier stages. This conservative rise of blood-pressure maintains the cerebral circulation despite the increased intracranial tension. The question of the cause of the increased intracranial tension does not concern us here. The view enunciated by Traube, that it is due to cerebral œdema, is feasible. If the tension progressively increases, the compensatory rise of blood-pressure above described cannot go on indefinitely, and a certain point may be reached beyond which no amount of vaso-constriction and cardiac augmentation can maintain an adequate cerebral circulation. If this point is reached gradually and the volume of blood passing through the brain be slowly diminished, we should-expect a comatose condition to develop, the last stage of cerebral compression with gradual respiratory failure, the high-tension slow pulse of the early stage of compression changing into a soft, rapid pulse, with the developing vaso-motor failure. A concomitant toxic action on the brain is not denied; such may be present and aid in the production of the cerebral symptoms. But the anæmia alone should suffice to induce the coma.

URÆMIC CONVULSIONS.

Under the severe strain imposed upon it in working against this conservative high blood-pressure the heart may fail rapidly in chronic nephritis. Should this occur, or should the vaso-motor centre fail rapidly, it is clear that the cerebral circulation must fail equally rapidly when the intracranial tension is pathologically high. Instead of headache and somnolence, gradually developing into coma, a more sudden unconsciousness would result, and if the failure in the circulation through the brain occur almost suddenly, convulsions would readily be produced.

It is of great interest to note that the onset of uræmic convulsions is, in fact, very apt to be associated with marked evidences of circulatory failure. According to Senator [41], "before the convulsions the pulse is often tense and slow, but during the attack it is small and accelerated and often irregular; as a rule, however, it cannot be counted accurately until after the attack, when it is also retarded in most cases." According to Strumpell [42], "the pulse is often very slow before the appearance of severe symptoms, sometimes 48 or 40, but it is almost always tense and hard. In chronic uræmia also a moderate slowness of the pulse is not infrequent. *When uræmic convulsions appear, however, the pulse usually becomes small and very frequent, especially in cases that terminate unfavourably.*"

Willson's cases above recorded are of the greatest importance in this connection, especially as, in his six cases of uræmic convulsions, the convulsions terminated in every case on the withdrawal of the cerebrospinal fluid; and it is to be noted that his best results were obtained in those cases in which the fluid spurted from the cannula, *i.e.*, in which the pressure within the cerebro-spinal space was greatest. *And this withdrawal of fluid, by lowering the cerebral pressure, would allow of an immediate return of blood to the brain.*

In cases of acute uræmia in acute nephritis it is well known that an increase of blood-pressure is common, and the cardiac failure may be more readily effected owing to the more toxic character of some of the diseases associated with acute nephritis, the poisons of the acute infections, such as scarlet fever, materially affecting the heart muscle. The heart would thereby be unable to respond to the vaso-constriction above described, and the conservative rise of blood-pressure would fail to develop.

In conclusion it is submitted that the pathology of uræmia is to be sought in a condition of increased intracranial tension with failure of the cerebral circulation produced in the manner suggested, a gradual failure producing coma; a rapid one, convulsions.

If this conclusion be correct, strong support is lent to the theory that the fits of idiopathic epilepsy are produced by sudden failures in the cerebral circulation, for it is notorious that the convulsions of uræmia and of idiopathic epilepsy may be absolutely indistinguishable, and it is extremely probable that the factor underlying conditions so remarkable and so identical should be one and the same.

STATUS EPILEPTICUS.

Morgan Hodskins and Arthur Morton [43] have reported a series of seven cases of status epilepticus treated by lumbar puncture. As they are of considerable importance, I give them in some detail.

"Case 1.—March 26, 1904. After forty fits, at intervals of about fifteen minutes, lumbar puncture was performed; 12 cc. of fluid withdrawn, not under very high pressure. Convulsions ceased for over two hours; then recurred, thirty-five in the next two days, but not so severe. Then slow recovery.

"Case 2.—April 18, 1904. Status epilepticus. One hundred grains of sodium bromide given hypodermically with no effect. Lumbar puncture after twenty-four severe fits, and 14 cc. fluid withdrawn under increased pressure. Only one more fit in next twelve hours, then a few slight ones, easily controlled, followed by exhaustion, paralysis of pharynx and extremities. Slow recovery.

"Case 3.—April 18, 1904. Twenty-five fits. Lumbar puncture, and removal of 14 cc. of fluid under slightly increased pressure. Five slight fits in next two and a half hours, than cessation of fits and quick recovery.

"Case 4.—May 19, 1904. Twenty-five fits. Lumbar puncture; withdrawal of 14 cc., not under greatly increased pressure, until convulsions occurred, when it squirted out in a stream. No effect; seventy-five fits in twenty-four hours, and death on following day.

"Case 5.—August 29, 1904. Seventy-five to 100 fits daily for past three days. Lumbar puncture and withdrawal of 15 cc. under considerable pressure.

Free from fits for three and a half hours, then a recurrence, the temperature rising to 109° F. before death.

"Case 6.—Status epilepticus. September 12, 1904. Status for thirty-six hours. Lumbar puncture; 15 cc. of fluid withdrawn under increased pressure. Free from fits for eight hours; then return of fits. Rise of temperature to 107° F. Death.

"Case 7.—Status epilepticus. October 12, 1904. Twenty-five fits. Lumbar puncture; 20 cc. of fluid withdrawn under increased pressure, followed by injection of 10 cc. of sodium bromide solution (gr. xxx. to the ounce). One fit occurred in the next fifteen hours. Slow recovery. The blood-pressure, which before the puncture measured 140 mm. of mercury, fell to 127 mm. afterwards."

It is noteworthy that in four out of the seven cases recovery ensued, and that in every case but one there was an immediate and marked improvement as the result of the lumbar puncture. Further, in six of the cases the cerebro-spinal fluid was evidently under increased pressure, and in the only case in which the blood-pressure was estimated it fell from 140 mm. of mercury to 127 mm. as the result of the puncture. These facts suggest that the condition of status is similar to what is seen in uræmia, in which, as has been pointed out, there is an increase of the cerebro-spinal pressure. And this increased pressure would tend to produce an anæmia of the brain unless the blood-pressure rose to a point higher than that obtaining within the cranial cavity. The inference, therefore, that status epilepticus is due to anæmia of the brain brought about by increased intracranial tension does not appear unreasonable. There is no reason to assume that this increased pressure was the primary cause in bringing about the attack, but rather that an unduly severe fit in some way evoked an œdema of the brain, and that the increased pressure resulting from this was responsible for the anæmia.

Mott [44] has shown that "the essential changes in the brain in cases of status epilepticus are:—

"(1) Great venous congestion and stasis.

"(2) *Œdema of the brain* and marked distension of the perivascular lymphatics, flattening of the convolutions and naked-eye increased vascularity; but inasmuch as the brain is contained in a closed cavity, venous stasis and œdema must be associated with a corresponding *arterio-capillary anæmia*."

It is interesting also to note that Mott finds that experimental ligature of arteries in animals leads not only to anæmia of the brain, but also to œdema. Continuing the above quotation:—

"In the case of experimental ligation of arteries in animals, the effect may be similar, but it is brought about by an entirely converse process: the œdema of the brain and venous stasis are here proportional to, and determined by, the diminution of arterial blood in the arterio-capillary systems. . . . Microscopical observations show that the whole brain is permeated by a canalicular lymph system containing cerebro-spinal fluid, the large processes of the neurons lying in lymph spaces which are continuous with the perivascular lymphatics. These perineuronal spaces were very obvious in some of the cases of experimental anæmia."

In this connection it is a striking fact that, in his description of the photo-micrographs accompanying his paper, Mott comments on the close similarity between the appearance of the brain-cells and perineuronal spaces in experimental anæmia of the brain (by ligature) and in status epilepticus.

These observations, both clinical and pathological, lead to the conclusion that the fundamental condition underlying the condition of status epilepticus is cerebral anæmia. It might be urged that, inasmuch as it is not probable that there is a great rise of cerebral pressure, the heart should be able to respond by more powerful contractions which would maintain the cerebral circulation (*vide* Harvey Cushing's observations). It is profoundly interesting to note in this connection that the heart in cases of status epilepticus shows extreme fatty degeneration; thus Mott [45] has shown that "the œdema of the muscle substance of the heart is very striking upon microscopical examination; networks of capillaries are seen, small hæmorrhages are sometimes observed, and the fibres are separated from one another by a serous exudation. This of itself would embarrass the much over-worked organ; but the lymph around the muscle fibres no longer constitutes a normal environment, it contains excess of carbonic acid, deficient oxygen, and toxic fatigue products, the result of excessive muscular activity and imperfect metabolism. The fibres thus imperfectly nourished and oxygenated are the seat of an imperfect metabolism which is manifested upon microscopical examination by a lustreless appearance, indistinctness of striation and accumulation of minute particles of fat in the substance of the fibres. . . . In seven cases of status epilepticus, and in a large number of cases of general paralysis dying after prolonged convulsive seizures, I have invariably found this fatty change in the heart and striated muscles."

THE EPILEPTIFORM SEIZURES OF GENERAL PARALYSIS.

Mott has shown that "œdema of the brain, owing to dilatation of the perivascular lymphatics, is a striking feature in general paralysis, and the water which can be extracted from the brain by placing it in a desiccator is larger in amount than in the normal brain. But venous congestion and œdema of the brain must be associated with arterial anæmia. . . . If all the arteries to a dog's brain be ligatured, there is established an arterial anæmia, but the veins of the cortex will be found greatly congested, the perivascular lymphatics distended, and the motor cortex excitable, even hyper-excitable, to electric stimulation. This makes it probable that the epileptiform seizures of general paralysis are associated with and probably dependent upon venous congestions and stasis, arterial anæmia and increased excitability."

Leonard Hill has also demonstrated the increased excitability of the cortex after experimental anæmia has been brought about. Mott has also made the interesting observation that in general paralysis the arterial pressure in the first and second stages of the disease is invariably higher than normal. In the light of Cushing's work, it is possible that this is due to the compensating mechanism described by him, and is an effort to maintain a good circulation through the brain, the œdematous and anæmic condition of which has just been pointed out.

CONCLUSIONS.

It is submitted that sudden failure of the cerebral circulation is associated with unconsciousness and convulsive seizures. This is recognised in the case of the seizures occurring in conditions of bradycardia and arrhythmia, when the seizures obviously depend upon the failure of the heart rhythm. Gradual failure of the cerebral circulation is not associated, as a rule, with convulsions, but rather with coma. In uræmia the onset of cerebral symptoms may be either gradual or sudden, and convulsions may occur indistinguishable from those of idiopathic epilepsy. It is submitted that evidence has been given which correlates the coma and the convulsions to a gradual or sudden failure of the cerebral circulation.

In epilepsy the fits are frequently of absolutely sudden onset. It is submitted that the failure of the cerebral circulation (on which it is contended that they depend) must therefore be of sudden onset. Sudden cardiac inhibition is one of the few possible causes of such an event. It has been shown that such cardiac arrest does occur in some cases of epilepsy, and it is suggested that its occurrence may be much more common than is generally assumed. It is suggested that the cardiac inhibition is probably to be attributed to unstable vaso-motor and cardio-regulatory mechanisms, the causes of which are yet to seek. Abnormal biochemical processes may play a part, and inheritance counts for much.

It is suggested that the recovery from fits in which cardiac arrest occurs is due to a re-establishment of the cerebral circulation, the heart escaping from inhibition.

It is probable that some fits are due to cerebral vaso-motor spasm. The phenomena of some cases of *petit mal* seem explicable on this hypothesis. Attention has been drawn to the evidence of abnormal vaso-motor regulation in epileptics.

Hughlings Jackson remarks that "consciousness is concomitant with the functioning of the highest cerebral centres" [46]. I would, with great deference, suggest that the statement might be put this way: *Normal* consciousness is *conditional* upon *normal* functioning of the highest cerebral centres, but inasmuch as normal functioning depends upon normal blood-supply, the statement might be amended thus: Normal consciousness is conditional upon normal blood-supply to the highest cerebral centres. On the hypothesis that the convulsions of idiopathic epilepsy are due to a failure of the cerebral circulation, the highest cerebral centres, whatever and wherever they may be, would be equally involved with the lower, so that the epileptic fit would be compounded of discharges from the highest levels, the middle levels (motor regions) and the lowest levels (ponto-bulbar).

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DISCUSSION.

Dr. DAVID FERRIER, F.R.S., said he had listened with very great interest to Dr. Russell's paper, and complimented him on the ability with which he had marshalled his facts in support of the position which he had taken up. All would agree that there was still great obscurity prevailing as to the proximate cause of that instability of the grey matter which was the foundation of the epileptic discharge. He understood Dr. Russell considered that cerebral anæmia was always present. That cerebral anæmia, or ischæmia, would cause epileptic convulsions had been proved by the experiments of Kussmaul and Tenner, by Sir Astley Cooper, and still more conclusively by Dr. Leonard Hill, who described the symptoms which arose in connection with compression of his own right carotid. There was a gradual failure of consciousness and, at the moment of that loss, he was seen to have distinct epileptiform attacks in his left hand. From those facts one would be prepared to admit that cerebral anæmia might be the cause of that nutritional disturbance which was the basis of epilepsy. And Dr. Russell had brought forward many facts which showed that failure of the circulation, beginning in the heart in consequence of the condition of that organ, and possibly due to that alone, might give rise to epilepsy. But it had long been noticed by the earlier observers of epilepsy that there was frequently spasm of the blood-vessels, the radial pulse sometimes disappearing while the patient was under observation. He did not know whether the heart was noticed to stop at the same time, but there was frequently observed a vaso-motor spasm associated with pallor of the face, dilated pupil, and conditions which might lead even to cardiac inhibition. Sir Russell Reynolds has described how frequently these phenomena occurred in the early stages of an epileptic fit, but not always; for the heart might go on quite regularly and the pulse show no change. This was the basis of the old view that the epilepsy originated primarily in the condition of the medulla, causing irritation of the vaso-motor centres, and hence contraction of the blood-vessels, not only in the body, but in the brain itself. Though the brain did have some vaso-motor regulation, as had been proved conclusively by Dr. Brodie and himself, yet the direct vaso-motor regulation of the brain was probably subordinate to the other condition which had been demonstrated by Leonard Hill, that the condition of the circulation varied passively according to the condition of the skin and the splanchnic area. It was looked upon as a proof of cerebral anæmia that the face was pale. But according to the researches of Leonard Hill the brain would be flushed at the time there was vaso-motor spasm. Frequently at the commencement of the fit beating of the carotid would be noticed, while the radial pulse would disappear. His own opinion was that vaso-motor spasm, instead of producing anæmia of the brain, would have the reverse effect, namely, flushing. Dr. Russell had mentioned many cases where the heart stopped, but that was at the commencement of the fit, and he, Dr. Ferrier, would rather look upon that as a sign of the epileptic spasm or of the inhibition having begun. The epilepsy had not originated from the cessation of the heart; it was the discharge already commencing which was producing the inhibition of the heart. So the primary mischief was not in the heart, but in the brain-cells discharging, and so influencing the vaso-motor centre. But he would not say that this explanation would be applicable to all cases. He thought that if the heart rather than the brain were responsible for epilepsy, there should be better proof forthcoming of some definite relation between heart disease and epilepsy, or between interference with the innervation of the heart and the occurrence of epilepsy. He had recently read a paper by Leser giving the results of his investigations on this point. Leser found in about 500 epileptics that about 1½ per cent. of them had signs of heart disease; whereas in 800 cases of heart disease there was not 1 per cent. of epileptics. As to the state of the brain in epilepsy, it was well known that sometimes there were no visible changes, but in many cases changes had been found in the brain which might lead to its nutritional disturbance. Dr. John Turner had described conditions of the blood-vessels, nerve-cells, and the neuroglia, some of which might be primary, though he, Dr. Ferrier, regarded some of them as more probably secondary to the epileptic fits. A tumour, latent in regard to other signs, might cause epileptic fits and nothing else. One also knew what happened in the case of Jacksonian focal lesions: they did not always cause Jacksonian epilepsy, but often only ordinary epileptic attacks. In the artificial epilepsy induced in animals one had seen the brain, under the influence of stimulation, become hyperæmic and so irritable that the slightest touch on the brain would cause an epileptic explosion. He would say that cerebral anæmia, though sometimes occurring in and preceding epilepsy, did not necessarily precede it in all conditions, and that there might be varying states of the circulation. The essential factor was the state of nutrition of the brain-cells; not that nutrition was affected by the brain circulation, except in a secondary way. With regard to uræmic convulsions, was it not more likely that there were poisons circulating in the blood which acted directly on the brain-cells? One had only to look at the influence of drugs like absinthe in causing epilepsy in this relation. Absinthe and certain other drugs made the cortical cells more excitable. He believed that epilepsy depended on the state of nutrition of the brain-cells, which might be brought about in many ways, hereditary and otherwise, and not necessarily secondary to any conditions of the cerebral circulation.

Dr. BEEVOR congratulated Dr. Russell on his paper, and on the great trouble he had taken in getting his facts together. Fits could be produced by ligaturing vessels, which caused anæmia of the brain, but it did not follow that every case of epilepsy must be due to anæmia of the brain. He would deal with the three forms of epilepsy which the author had mentioned. First one could produce on animals, by stimulation of the thumb centre, a tonic contraction of the thumb by means of a weak current. By a stronger current one could cause an epileptic fit localised to the hand, and by a still stronger current a fit involving the whole body could be produced. In that case he could not see that the heart was affected, the occurrence was purely local. The question was whether the vaso-motor system could be brought in to aid in the explanation. He gathered that in every case Dr. Russell would consider that there was some anæmia of the brain. In the case of fits produced in man by tumours, there might be a fit without loss of consciousness, and it seemed almost impossible to attribute any of the symptoms to the heart stoppage. A tumour might grow and produce fits, not Jacksonian but those which were hardly distinguishable from those of ordinary epilepsy. In that case there was the same cause, namely, a tumour producing irritation of the brain, and he did not see how the heart's action could be taken into account. With regard to *petit mal*, it seemed to him impossible to imagine that the effect of heart stoppage could be so limited that loss of consciousness was produced and the patient did not fall down. In *petit mal* the patient might have complete loss of consciousness, and still go on walking or standing and not fall down. Attacks of *petit mal* might go on and be combined occasionally with attacks of idiopathic epilepsy, and it was difficult to attribute the *petit mal* to one cause and the idiopathic epilepsy to another. He thought they must be due to the same cause, and that cause not the stoppage of the heart's action. Was the primary disease in the heart or in the cortex of the brain? He thought the cause must be some irritation of the cortex. In the cases of uræmia and absinthe there was cortical stimulation, without any action on the heart. It was probable that in idiopathic epilepsy the brain cortex was highly excitable and fired off on the slightest provocation, so that what in an ordinary person would cause a headache would in such a person cause an epileptic fit. It had been asked why, in a case of tumour of the brain, the fits were localised, and showed no tendency to spread, whereas in epilepsy the whole body was involved in the fit? He thought one reason was that the stimulation in epileptiform attacks was local, whereas in idiopathic epilepsy the whole brain was concerned. Another point was the different resistance in the brain of a normal person compared with that of an epileptic. Dr. Ferrier had referred to the hyper-excitable condition of a brain which had been constantly stimulated electrically, and he, Dr. Beevor, had seen the same thing several times when working with Sir Victor Horsley on the monkey, so that it became necessary to leave that part and go to another. He thought one might compare the difference between a normal brain and an epileptic brain to the difference in the combustion of sheep's wool as compared with that of cotton wool. If sheep's wool caught fire in one place, surrounding parts simply became singed; whereas in the case of cotton wool, there was an immediate flaring of the whole piece. A knock on the head of an ordinary person which would produce little effect might, in the case of an epileptic, bring on a general fit.

Dr. GOSSAGE said he did not think there was any doubt that cerebral anæmia could cause fits which were much like those of epilepsy, but, as had been remarked, that did not prove that "idiopathic" epilepsy was due to cerebral anæmia. In patients who had epileptiform fits, undoubtedly due to cerebral anæmia, there was not, as a rule, the regular progression of tonic and clonic spasms such as occurred in a fit of idiopathic epilepsy. Cerebral congestion could also produce a fit of a similar character, and one of the common causes of convulsions in infants was congestion of the brain, such as occurred in the asphyxia following broncho-pneumonia or other disease. With regard to cerebral anæmia causing epileptiform convulsions, in undoubted cases a considerable period of cessation of the circulation was necessary before convulsions resulted, *i.e.*, from ten to thirty seconds; and if, as Dr. Russell thought, cardiac inhibition was the commonest cause of epileptiform fits, there should be much more evidence than was available as to the occurrence of such inhibition, though possibly most of those who watched an epileptic fit had not their attention directed to the heart. In regard to the cases quoted where the heart stopped at the commencement of an epileptic fit, the question arose whether they were not of a special class, allied to the Stokes-Adams syndrome. This syndrome was described as a condition of infrequent pulse associated with various nervous phenomena, such as syncope, epileptiform convulsions, or even apoplectiform attacks. In the Stokes-Adams syndrome, the ventricular arrest occurred before the cerebral phenomena. The essential point in this condition was that the conductivity between the auricles and the ventricles was depressed. The beats might be blocked, so that the ventricles might beat only once to every two beats or more of the auricles. It was possible, however, to have the conductivity between the auricles and the ventricles depressed, and yet the ventricles responding to every auricular beat: and with the occurrence of some nervous influence which depressed the conductivity still further it was possible to have a temporary arrest of ventricles resulting in an epileptiform fit. He showed some tracings illustrating that point. The patient exhibited the Stokes-Adams syndrome, and his pulse had nearly always been infrequent. Yet when first seen his pulse was 68, and during a taking of a tracing at that rate it had suddenly stopped for five seconds. The man on this occasion had merely an attack of giddiness and a tendency to fall, and then recovered, but on other occasions there had been severe epileptiform fits. It was possible that the cases mentioned by Dr. Russell, where there was cardiac arrest at the time of the epileptiform attack, were of the same character, namely cases of delayed conductivity between auricles and ventricles, and not of the class of ordinary idiopathic epilepsy.

Dr. **BIERNACKI** desired to discuss the matter from the point of view of the infective fevers. For some years he had had the conviction that not enough attention had been paid to syncope in relation to the convulsions of children. In fevers one found not very rarely that children had recurrent attacks of syncope with convulsion, not necessarily in the early stage—possibly even after convalescence. In these cases there was no definite quantitative relation between the degree of the syncope and the degree of the convulsion. That was a difficulty to him from the point of view of Dr. Russell's theory. In convalescence a child might have, from time to time, attacks of a kind which seemed typically epileptic. The distinction was that some of those cases died. He had the history of a family which was remarkable. The mother had chorea when she was aged 15. The father's history was unimportant, but he was rather nervous. The first child was still-born. There was a child who had no fits or syncopal attacks. The next child was found dead in his cradle when thirteen months old. There was an inquest, and a post-mortem was made by a thoroughly efficient man, and nothing to account for death discovered. Another child, aged 7, had had no attacks until thirteen months old, when there were moments of daze, bronchitis. At eighteen months it had fainting fits for twenty-five minutes while sitting on its father's knee, with jerking of the eyes and head. The child was quite unconscious, dead pale, and stone cold. There had been one or two other attacks, since when the child had been in good health. The next child, a girl, died at the age of eight months. She was put into her cradle one night in good health at 11 p.m. and suddenly died. The autopsy showed no evidence of cause of death, though there was hyperplasia of the glandular tissue in the abdomen. The last child was a boy, aged 3½, who had bronchitis badly when he was cutting his teeth at thirteen months, and later occasionally. He had bronchitis and pneumonia when aged 3. He had his first syncopal attack six months ago, with pallor, movement of the eyes, pinched face, and was very cold. The attack lasted about twenty minutes, and he seemed conscious.

Dr. LINDSAY STEVEN said Dr. Russell had raised a very important point as to the vaso-motor influences upon the circulation of the brain, and he agreed with much of what the author had said with reference to the production of cerebral anæmia causing epilepsy. He agreed with Dr. Russell that enough weight had not hitherto been attached to the fact of vaso-motor anæmia of the brain as a cause of cerebral diseases, among them possibly epilepsy. In Scotland it had long been taught that actual palsy might occur from cerebral spasm, without rupture of the arteries, due to localised anæmia; but the point he specially wanted to refer to was the relationship between anæmia of the brain and Raynaud's disease. Dr. Russell referred to the case quoted by Osler, in which, during an attack of Raynaud's spasm, aphasia and other nervous symptoms resulted. During the present winter, in his, Dr. Steven's, wards in the Western Infirmary, Glasgow, a woman was admitted who was suddenly taken ill and had, not an epileptic fit, but a fit with loss of speech and slight hemiplegia. She retained her intelligence. Shortly after admission she lost her vision and her power of swallowing, so that for seven weeks it was necessary for the nurse to feed her by the nostril. During her illness she developed typical symmetrical gangrene of the extremities. A post-mortem examination was made by Professor Muir, and it was found that her bulbar paralysis was due not to a lesion of the bulb at all, but to a bilateral lesion of the cerebral hemisphere, which consisted entirely of a widespread white necrosis of the brain, without any visible arterial disease in the circle of Willis, or any other part of the brain. Professor Muir's opinion (with which Dr. Steven, who was present at the autopsy, quite agreed) was that the condition was due to widespread arterial spasm, probably of the nature of Raynaud's disease, similar to that which had caused gangrene in the toes and extremities of the fingers. Such a case was of importance in relation to what Dr. Russell had brought forward, namely, that temporary and widespread spasmodic anæmia of the brain might not only produce temporary abolition of function, but, if long continued, might actually cause severe structural degeneration in the cerebral cortex. In the case he had mentioned there was also slight endocarditis, both aortic and mitral valves were affected, and there was renal disease, but neither of those accounted for the cerebral necrosis.

Dr. FARQUHAR BUZZARD said two examples had been brought forward suggesting, with very little in the way of proof, the possibility of sufficient vaso-constriction of the cerebral arteries to produce local ischæmia and necrosis. One had been quoted by Dr. Russell from the writings of Professor Osler, and the other had been mentioned by Dr. Steven. The fact that in neither of those cases was there loss of consciousness or convulsions had an important bearing on the suggestions which had been brought forward by Dr. Russell.

Dr. RUSSELL, in reply, said that if the heart stoppage was not connected with the fit, it was curious that it immediately preceded the fit. It must be admitted that there were cases in which the stoppage of the heart was succeeded by a fit, and it was suggested by Dr. Ferrier that that was a sign of the discharge ; but as stoppage of the heart could produce a fit, it would be very odd if that should occur as a mere side issue in the course of some other procedure alleged as the cause of the fit. He did not really attribute the fit to heart disease, but rather to the unstable relationship between the great vagus nerve and the general vaso-motor system ; owing to irregularities of control of the vaso-motor system, there was an accidental sudden cardiac inhibition. He had read Dr. John Turner's valuable paper, but thought that his conclusions were open to discussion. For instance, he, Dr. Russell, was not aware that peripheral thrombosis occurred more frequently in epileptics than in other people ; he had not seen a case of ordinary epilepsy with thrombosis. He was quite satisfied that it occurred in the brain, but submitted that it was the result, not the cause, of a fit. It had been said that there was a preponderence of nuclein in the clot ; but before that could be accepted as peculiar to epilepsy, it would have to be shown that it did not occur in other clots. He admitted that the phonomena of Jacksonian convulsions were difficult of explanation, but he did not regard the Jacksonian fit as being quite the same as an ordinary epileptic fit ; the latter, being a very sudden phenomenon, surely must have a very sudden cause. The Jacksonian fit was, fundamentally, of gradual onset, and it might conceivably be due to spreading vaso-constriction. With regard to uræmia, he was ready to believe in the existence of poisons circulating in the blood, but the nature of such poisons had never been determined. He thought that the evidence of increased intracranial tension in uræmia and the frequent recovery after the diminution of that tension by lumbar puncture pointed to a mechanical rather than a chemical cause. Phenomena seen in an uræmic convulsion and an epileptic fit were so similar that evidence that they were of different nature must be overwhelming to be accepted. His idea was that there must be a common factor to both. The effect of absinthe was very difficult to explain, and he hesitated to submit any suggestions on the matter. The case of Dr. Walter Broadbent's, in which the blood was prevented from returning to one side of the cortex by an embolus, and in which the contralateral side showed no clonic spasms, was in favour of the view that the return of the blood, after the period of cardiac inhibition, was the cause of the clonic spasms. He could not agree with Dr. Gossage's objection to his comparison of the fits attending bradycardia with those of epilepsy, viz., that the former were only *epileptiform*, in that in genuine epilepsy, short of the fully developed fit, there were so many incompletely developed attacks, auræ only, unconsciousness only, slight fits, &c. In other words epilepsy itself showed many attacks which could only be called epileptiform. He agreed that cerebral congestion accompanied a fit, but it was venous, it was the result of the muscular spasms and was concomitant with an arterio-capillary cerebral anæmia. Cases of bradycardia occurred with long cardiac asystole not accompanied by a severe fit, and he suggested the following explanation: that though there was ventricular asystole, the auricular systole might be projecting blood through the auricular and aortic valves, the peripheral pressure in the aorta being very small, so that some circulation might be going on. The question had been asked why there were so many cases of recorded arrest. The arrest was very sudden and very transient, and unless the finger happened to be on the pulse at the moment it was not observed. If inhibition occurred for a few seconds, say from ten to fifteen, or perhaps less, the patient would have a fit. The features of the family mentioned by Dr. Biernacki would require more time to discuss than was available. The case related from Glasgow by Dr. Steven was extremely interesting and valuable. In conclusion, Dr. Russell expressed his obligation to Fellows for so fully discussing his paper.

Medical Section.

January 28, 1908.

Dr. SAMUEL GEE, President of the Section, in the Chair.

The Pathology and Treatment of Chronic Constipation.

By ARTHUR F. HERTZ, M.D.

THE treatment of chronic constipation is always experimental. One method is tried after another until by chance that suited to the individual case is discovered. This unsatisfactory state of affairs is due mainly to the fact that it has hitherto been impossible to determine the actual part of the intestines in which the delay causing the constipation occurs. In the case of medicinal treatment the difficulty is made greater by the lack of reliable information as to the relative effects exerted by any given purgative on different parts of the alimentary canal. Hence there are no rational guides to indicate what drug, if any, should be employed in each case. It seems probable that enemata would prove of value in those cases only where the delay occurs somewhere between the splenic flexure and the anus. For this reason it may, perhaps, be assumed that constipation relieved by enemata is due to sluggish action of the lower part of the colon. But enemata are not often employed without the simultaneous administration of purgatives, so that it has not been possible to separate a clinical group of cases in which enemata and not aperients are indicated.

In recent years abdominal massage and hydrotherapy have been much employed in the place of drugs in the treatment of those severe forms of constipation which do not yield to dietetic and other simple measures. Except in the cases associated with a weak abdominal wall, massage is generally directed along the course of the colon; its use is thus limited to cases in which the accessible part of the colon, excluding, therefore, the pelvic colon and rectum, does not function normally. It is, however, used by some as a matter of routine in most cases of constipation, although there are no criteria to decide which cases, if any, are due to inactivity of this particular part of the bowel.

Finally, in severe cases of chronic constipation the ileum has been joined to the pelvic colon or rectum and the intervening portion of the colon has been removed. This drastic treatment might, perhaps, be justified if it were possible to make certain that an abnormal condition of the part of the intestines removed was the sole cause of the constipation. But up to now no evidence has been available to prove this, so that it is only possible after the operation to say whether the treatment suited the case.

Some investigations I carried out last year with the aid of the X-rays on the movements of the alimentary canal in healthy men[1] led me to attempt by the same method to discover what part of the intestines is to blame in different cases of constipation, and so, perhaps, to obtain a rational basis for treatment. It is only in the severer cases of chronic constipation, such as those in which the question of operative interference might arise, that the somewhat prolonged investigations required could be profitably carried out in practice. But I hope that the examination of a large number of cases of constipation of every variety and degree of severity may lead to the discovery of some simple clinical signs, which will show what part of the intestines is at fault. It may also be possible to discover by similar means the exact effect of the various drugs and other measures employed in the treatment of constipation, so that each case may at once be provided with a suitable treatment. Up to now I have only been able to investigate a limited number of cases, but the results obtained, especially in two patients suffering from extremely severe chronic constipation, who would probably have been regarded by some authorities as suitable cases for colectomy, will, I hope, be thought of sufficient importance to justify the publication of this preliminary paper.

The method employed consists in the administration at breakfast of between 1½ oz. and 2 oz. of bismuth carbonate mixed with bread and milk and the subsequent periodic examination of the patient with the aid of the X-rays. This large dose of bismuth has never produced any unpleasant symptom, and on no single occasion in healthy individuals was constipation or any other disturbance of the normal activity of the alimentary canal produced. The time relations obtained by means of the X-rays can therefore be looked upon as normal.[1]

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[1] "The Passage of Food along the Human Alimentary Canal." *Guy's Hosp. Repts.*, 1907, lxi., p. 389; also *Brit. Med. Journ.*, 1908, i., pp. 130, 191.

Before describing the results obtained in patients suffering from constipation I should like to show for comparison a lantern slide which illustrates the typical appearance seen in a normal individual when

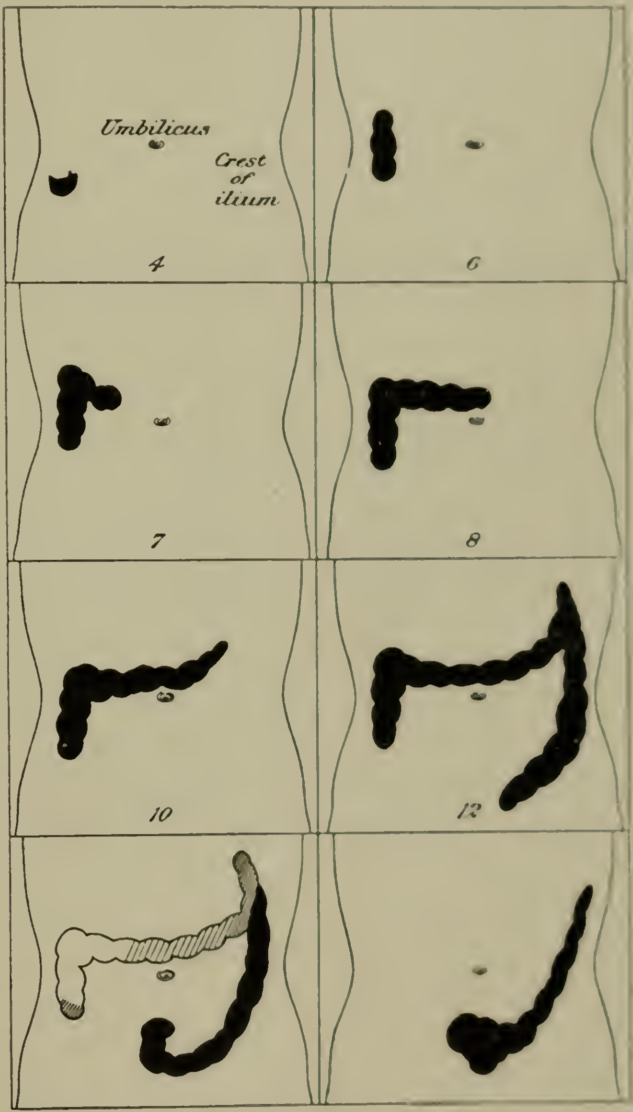

Fig. 1.

Series of colon skiagrams in a normal individual. The numbers represent the hours after a bismuth breakfast was taken.

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[1] I am much indebted to Dr. Morton, and also to Mr. Shenton and Dr. Jordan, who helped me on a number of occasions in his absence, for their invaluable assistance in the X-ray examinations of the cases.

examined by the X-rays at various periods after a bismuth breakfast (fig. 1). The average normal time for the food to reach the cæcum is four and a half hours; two hours more are required for it to reach the hepatic flexure, and another two and a half hours the splenic flexure. The rate of the passage through the descending colon is somewhat slower, and the activity of all parts is lessened during sleep.

CASE I.—SEVERE CONSTIPATION OF SEVEN YEARS STANDING IN A GIRL, AGED 17.

Mabel T., aged 17, has suffered from constipation since she was aged 10. She says that she has only herself to thank for her present condition, which she ascribes to her former habit of restraining the desire to defæcate. As a little girl she had no time to visit the lavatory before going to school, and when there she was too shy to ask for permission to retire. When aged 15 she began to work as a dressmaker. By this time she had already become very constipated, but with the aid of medicine she was still able to open her bowels every other day. Unfortunately the desire to defæcate came on during the morning, when she was at work. If she retired she required a long time to open her bowels, as the mechanism concerned was apparently becoming inefficient. Her companions teased her on account of her long absence, so she no longer obeyed the reflex call to defæcation. This gradually became weaker, and her difficulty in defæcating, when she attempted to do so, increased. Her bowels were now opened only once or twice a week; she was occasionally sick, her appetite was poor, and she always felt slack and unequal to doing any work. The trouble reached a crisis when, on February 22, 1907, she was admitted into Guy's Hospital, as her bowels had then not been opened for five weeks. Her abdomen was somewhat distended and tender, her tongue was dry and furred, and she vomited occasionally. She was given an enema at once, and a large quantity of fæces was evacuated. She remained in the hospital for some weeks and was treated with various purgatives, but her bowels were only opened when an enema was given.

After her discharge she was treated by electric massage of the abdomen, but no improvement resulted, so on May 24, 1907, she was readmitted into Guy's Hospital, under Dr. Shaw, who kindly allowed me to investigate her condition. She still complained of pain in the abdomen, which was somewhat distended, the lower part being tender. She was occasionally sick and had a very poor appetite. Her complexion was sallow and her expression apathetic. Her bowels were opened by an enema the day after admission. After this she was given a full diet but no medicine, and her bowels were not opened again until May 28, four days after admission. On May 27, at 6 a.m., she was given 1½ oz. of bismuth carbonate in bread and milk. At 10 a.m. the shadow of the cæcum and the whole ascending colon was distinctly visible on the fluorescent screen (fig. 2*a*). In normal individuals a shadow is generally present in the cæcum four hours after a bismuth breakfast, but I have never seen it reach the hepatic flexure at so early a period. It is thus clear that the passage of food through the small intestine and ascending colon was abnormally fast instead of abnormally sluggish, as might have been expected. At 4 p.m., ten hours after the breakfast, the shadow of the large intestine from the cæcum to the end of the iliac colon was visible (fig. 2*b*); on only one occasion in the numerous examinations made of normal individuals did the bismuth reach as low as this in the same time, the average point attained being the splenic flexure. At 10 a.m. the next morning, twenty-eight hours after the bismuth had been taken, it had all accumulated in the greatly distended sigmoid flexure, except a small quantity which was still present in the ascending colon (fig. 2*c*). In one normal individual all the bismuth had been passed in the fæces and in another all had collected in the sigmoid by this time; with these two exceptions there was in all cases a considerable amount of bismuth still present in the descending colon and sometimes in the ascending and transverse colon at this period. Thus the passage

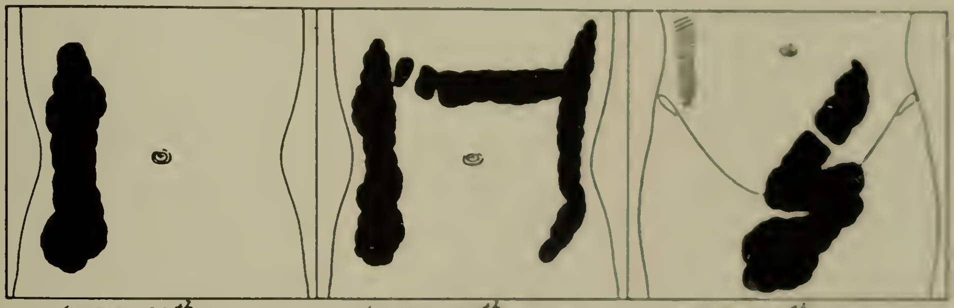
(a) May 27th 10 a.m. *(b) May 27th 4 p.m.* *(c) May 28th 10 a.m.*

Fig. 2.

Severe constipation in a girl, aged 17. Bismuth breakfast at 6 a.m., May 27.

of the intestinal contents through the colon, as well as through the small intestine, was, in this severe case of constipation, unduly rapid rather than unduly slow.

As the patient complained of a good deal of pain at 11.30 p.m. on May 28 (the day after the bismuth meal), a rectal examination was made. The anal canal was found to be very short, the upper part having become relaxed and added to the rectum. The rectum was abnormally large in diameter and was completely filled with moderately hard fæces. In spite of this the patient felt no inclination to defæcate, and was quite unable to do so when she tried. The fæces were softened by the finger and an enema was then given. A large amount of moderately firm fæces, stained black by bismuth sulphide, was evacuated, with the result that the patient experienced considerable relief. The next morning at 6 a.m. another enema was given and a further quantity of fæces was passed, but less than on the previous evening. At 10 a.m., fifty-two hours after the bismuth meal, no trace of a bismuth shadow could be detected anywhere, proving that the enemata had removed all the bismuth from the colon.

It is clear that in this case the seat of the constipation was the sigmoid flexure and rectum. The skiagram showed that the former was dilated ; digital examination showed the dilated condition of the rectum. Moreover, part of the anal canal appeared to have been distended so as to act as part of the rectum. Digital examination in normal individuals shows that a small quantity of fæces is generally present in the rectum, but not in sufficient quantity to produce distension. Normally, when the rectum is distended, a desire to defæcate is felt, and this becomes still more marked when fæces enter the anal canal. In this case the rectum was considerably distended and fæces were present in the anal canal, but the patient experienced no definite desire to defæcate. This means that the rectum and anal canal must have become so far anæsthetic that the normal defæcation reflex no longer occurred. On attempting to defæcate, although plenty of material was present in the rectum, the patient was invariably unsuccessful. This must have been due to an atonic and paretic condition of the muscles of the sigmoid and rectum, as the rest of the colon was normal, the diaphragm moved well, and the abdominal muscles were moderately strong. Thus the cause of this patient's constipation was an atonic condition of the sigmoid flexure and rectum and an anæsthetic condition of the rectum and anal canal.

The constipation in this case probably started, as suggested by the patient herself, as a bad habit. When aged only 10 she did not respond to the first slight sensations which indicate that defæcation should take place. The result of putting off defæcation was well seen in one of the normal individuals examined in our study of the process of defæcation.[1] At 9 a.m. he felt, as usual, the desire to defæcate, but, as he had on the previous evening at 11 p.m. taken 1½ oz. of bismuth, he wished to give us the opportunity of examining his colon before and after defæcation. He therefore restrained the desire, which at one time was sufficient to produce some colicky pain. By 9.30 a.m. the desire to defæcate had disappeared. On examination at 10 a.m. no shadow was seen in the colon, except the iliac and pelvic parts, the latter being in a condition of considerable distension. Under normal conditions in ten hours the whole colon could have been seen in this individual, so that the voluntary inhibition of defæcation must have led to increased peristalsis of the colon, giving rise to colic and causing it to empty its contents into the sigmoid, which consequently became distended. On subsequently attempting to defæcate the distended sigmoid was to a large extent emptied, but if no effort had been made, and the natural call to defæcation had on future occasions been neglected, the sigmoid flexure would no doubt have become permanently dilated and lost the tone and contractile power of its musculature, as in the case of the patient under consideration. Having determined that the small intestines and colon as far as the pelvis acted normally, it was easy to understand the failure of previous treatment. This had consisted mainly in the administration of various purgatives. Their action is probably partly on the small intestine and partly on the colon. It is well known, from experience in cases of peritonitis and after abdominal operations, that purgatives have no action on paralysed intestines. Hence purgatives could hasten the peristalsis of the already over-active small intestine and colon, and in doing so would probably give rise to colicky pains, but would be quite without effect on the paralysed and distended sigmoid flexure. Massage also could only have been applied to parts of the intestine which were normal, the abnormal sigmoid flexure being for the most part out of reach.

Colectomy would have proved equally useless as a cure for the constipation. The normally acting colon would have been removed, and the abnormal sigmoid flexure and rectum would have been left behind. It seems quite possible that the operation of colectomy has often been performed in cases of this kind, for it is claimed that the toxic symptoms and pain are relieved, though constipation is sometimes as bad as ever, the patient still requiring aperients or enemata in order to obtain a proper action of the bowels. The toxæmic symptoms may disappear because the length of the colon from which toxins can be absorbed is diminished, and care is taken after the operation to keep the rectum empty by means of enemata. The pain is relieved because it is due probably to the hyperactivity of the colon in its attempts to pass the obstruction in the sigmoid flexure; the hyperactivity is often made still more marked by the injudicious administration of purgatives. Thus the good effects which might possibly follow the operation could be explained even if an inoffensive colon had been removed.

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[1] *Brit. Med. Journ.*, 1908, i., p. 192.

In the most recent form of the operation a large part of the sigmoid colon is removed in addition to the more proximal part. It is possible that in cases such as that under consideration an operation confined to the sigmoid colon might do a certain amount of good, although the abnormal rectum would still be left; the severity of the operation would be greatly diminished and the greater part of the colon, which is without doubt a useful organ and not a mere encumbrance, would be spared.

But there is one method of treatment for such a case as that under consideration, which not only relieves the toxic symptoms and the pain, but also does away with constipation, without jeopardising the life of the patient by the performance of what is, even in the most skilful hands, a dangerous operation. This consists in the use of daily enemata. The treatment is simple enough, but I find that it has been curiously overlooked in the management of severe cases of chronic constipation. This patient had been under treatment for years, and had taken large quantities of purgatives. But enemata had only been used at intervals. The idea seems to have been that purgatives, regularly administered for a fortnight, at last bring the fæces into a position where an enema can act upon them. An enema is given and the bowels are opened. Medicine is once more prescribed and the bowels remain unopened until the next enema is given two or three weeks later.

After it was seen that the enemata given on the evening of May 28 and on the morning of May 29 completely removed the accumulated fæces, a daily enema was given to the patient. It was found to produce a normal stool every morning without exception. The patient was kept on full diet and allowed to walk about as much as she pleased. By thus keeping the sigmoid and rectum empty it was hoped that their tone might return; but although the patient was told to try to defæcate every morning before the enema was given, she was never successful. On June 11, enemata having been given every day since May 29, 1½ oz. of bismuth carbonate were given in bread and milk at 6 a.m. after the enema had been administered. At 10 a.m. the cæcum and a small part of the ascending colon were seen with the X-rays (fig. 3*a*); at 2.30 p.m. the cæcum, ascending colon and most of the transverse colon were visible (fig. 3*b*).

The next morning no enema was given, and at 11 a.m. most of the large intestine from the cæcum to the beginning of the pelvic colon could be seen (fig. 3*c*). At 5 p.m. the pelvic colon was also visible, and was found to be no longer distended (fig. 3*d*). On June 13, at 6 a.m., forty-eight hours after the bismuth breakfast, an enema was given with a good result; at 10 a.m. no bismuth shadow was visible. These observations show that the sigmoid flexure was no longer distended, and that with the removal of the obstruction the stimulus to increased peristalsis in the colon had gone, so that the bismuth passed at the normal rate through the intestines instead of at a rather greater speed than normal, as observed after the first bismuth meal.

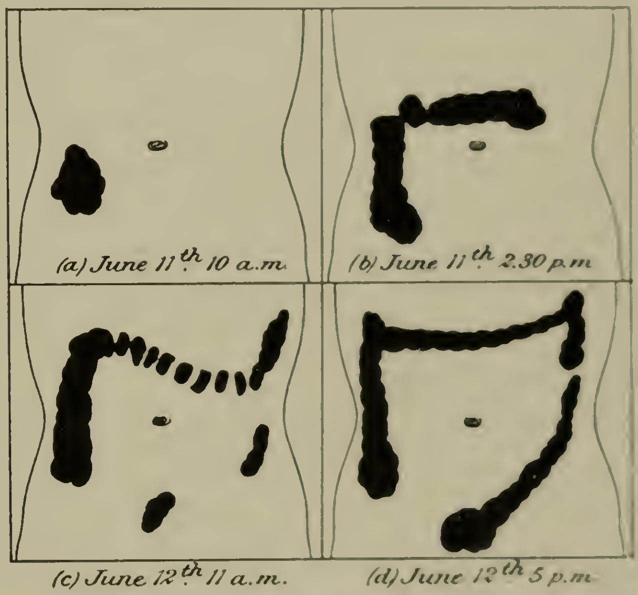

(a) June 11th 10 a.m.
(b) June 11th 2.30 p.m.
(c) June 12th 11 a.m.
(d) June 12th 5 p.m.

FIG. 3.

Case I., after treatment for a fortnight with daily enemata. Bismuth breakfast at 6 a.m., June 11.

The patient was now almost completely free from pain, and looked and felt much better than she had done for a long period. A final attempt was made to hasten the recovery of the atonic sigmoid flexure and rectum by means of intrarectal electrical treatment, applied in the method recommended by Boas. This had no appreciable effect after ten days, so it was discontinued. The patient was then discharged from the hospital, and her mother was instructed to give her an enema regularly every day, and to encourage her to try to open her bowels without artificial assistance. Perhaps in course of time the pelvic colon and rectum may regain their lost functions. Meanwhile the patient must continue to have a daily enema—no great hardship if it leaves her unmutilated and relieved of pain and other symptoms, which, after seven years of chronic constipation, seemed likely to render her a permanent invalid. If her condition had been recognised at an earlier period, when fæces in the anal canal still produced the desire to defæcate and the muscles of her pelvic colon and rectum were still sufficiently strong to enable her to open her bowels occasionally without artificial aid, a complete cure could in all probability have been obtained. Daily attempts to open her bowels at a specified time, and the administration of an enema whenever the attempt failed, would probably have resulted in the latter being required less and less frequently, until finally it could be entirely dispensed with.

I saw this patient again on January 29, seven months after her discharge from the hospital. She looks and feels much better, though she still is quite unable to open her bowels without the aid of an enema. She has an enema on alternate days, and it has only once failed to act during this period.

CASE II.—SEVERE CONSTIPATION OF THIRTY-THREE YEARS DURATION.

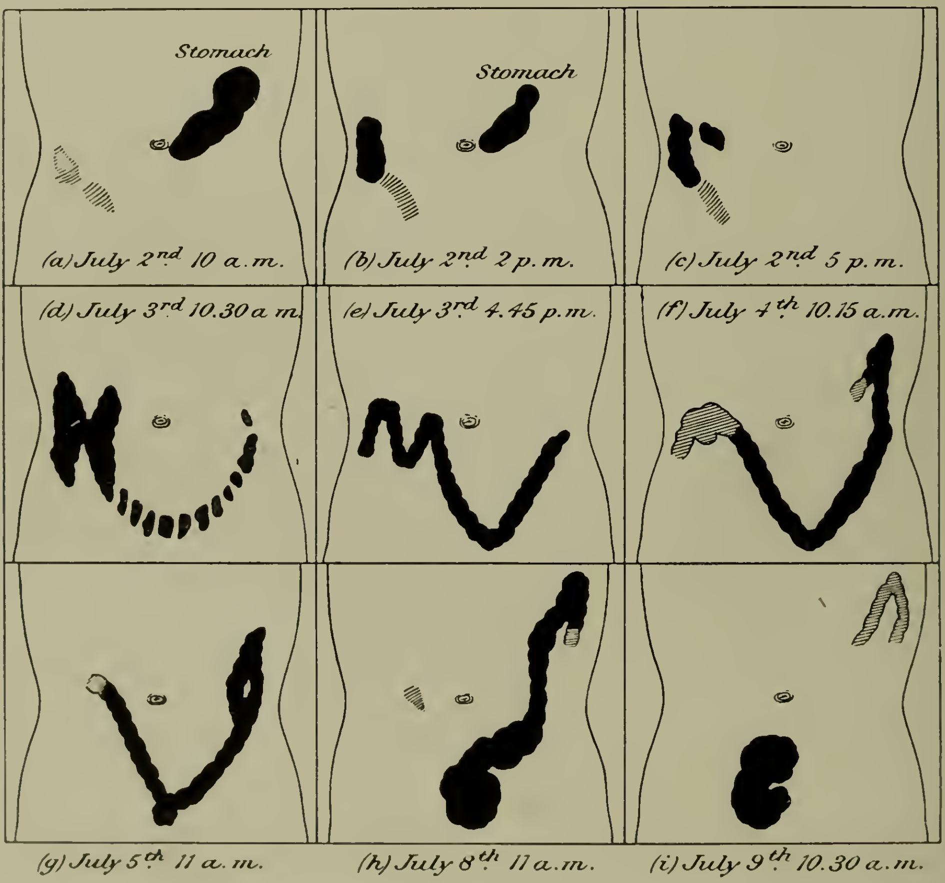
Emily H., aged 54, has been constipated for over thirty years. During this period she has been under continuous medical treatment, privately and as an out-patient, and she has been in the hospital six times for her constipation. In 1892, when aged 39, Mr. Lane performed Whitehead's operation on her for hæmorrhoids, which had been painful and had caused severe hæmorrhage on frequent occasions during the previous twelve years. During those years defæcation had been so painful that she dreaded going to stool, and so, no doubt, made her constipation still worse by not responding to the normal defæcation reflex. In 1898 she was again in a surgical ward for complete constipation of fifteen days duration. The rectum was found to be distended with fæces. Castor oil, aloes, and rhubarb were given without result, and the bowels were not opened until four days later (*i.e.*, the nineteenth day), when an enema was administered. The drug treatment was continued, but the bowels were not opened until a second enema was given nine days later. Later in the same year she was admitted into Guy's Hospital under Dr. Taylor, when, for the first time since the trouble began, her bowels were well opened every day. This was accomplished by giving her a daily enema but no medicine. When discharged she was advised to continue the daily use of enemata, but she did not do so.

In 1899 she was again in the hospital. She was given medicine and occasional enemata. The latter invariably had a good result. The next year she was once more an in-patient for nearly two months. During this period she was given large quantities of many different purgatives, and was also treated by abdominal massage and electricity, but her bowels were rarely opened unless an enema was also administered.

During the last eight years she has been attending as an out-patient and has regularly taken large doses of purgatives, but her bowels have only been opened once or twice a week, and sometimes only once in two or three weeks, an enema being always required to accomplish this.

On June 29, 1907, she came into the hospital under Dr. Shaw, who was kind enough to allow me to investigate the cause of her constipation. She complained of a good deal of abdominal pain and felt weak and disinclined to be active. She was depressed and looked anæmic and ill. The lower part of her abdomen was somewhat tender, especially the left side. Nothing abnormal could be felt, except some scybala in the iliac colon. The abdominal muscles were not well developed, but no definite physical signs of enteroptosis could be made out.

On June 30 an enema was given and a large and well-formed motion resulted. After this the patient was kept on a full diet, but no medicine or enema was given, her bowels remaining unopened until July 9. At 6 a.m. on July 2, 1½ oz. of bismuth carbonate in a bowl of bread and milk was given. At 10 a.m. the stomach was still well seen; it was slightly dilated and reached a little way below the umbilicus, but not to the right of the middle line. There was a faint shadow present in the cæcum (fig. 4*a*). At noon the stomach shadow was smaller and that of the cæcum more obvious. At 2 p.m. the stomach shadow was still smaller, and the cæcum and the ascending colon up to the level of the umbilicus were visible (fig. 4*b*). At 5 p.m. the whole of the ascending colon and a small piece of the transverse colon could be seen (fig. 4*c*). The next morning (July 3), at 10.30 a.m., the cæcum, ascending colon, and most of the transverse colon were visible. The latter had a double bend, the first being small and entirely to the right of the umbilicus, the other being large, its convexity reaching low down into the pelvis (fig. 4*d*). At 4.45 p.m. the bismuth had reached no further, but the cæcum, ascending colon, and the first loop of the transverse colon were thinner, as if they had contracted and passed some of their contents into the second loop of the transverse colon (fig. 4*e*).



(a) July 2nd 10 a.m. (b) July 2nd 2 p.m. (c) July 2nd 5 p.m.
(d) July 3rd 10.30 a.m. (e) July 3rd 4.45 p.m. (f) July 4th 10.15 a.m.
(g) July 5th 11 a.m. (h) July 8th 11 a.m. (i) July 9th 10.30 a.m.

FIG. 4.

Emily H. Severe constipation. Bismuth breakfast at 6 a.m., July 2.

At 10.15 a.m. on July 4, the second morning after the bismuth breakfast, the cæcum, ascending colon and first loop of the transverse colon were faintly visible. The second loop was well marked and the shadow now extended to just beyond the splenic flexure (fig. 4*f*). On July 5, the third morning, at 11 a.m., the cæcum, ascending colon and first loop of the transverse colon were no longer visible. All the rest of the colon up to the beginning of the pelvic colon could be seen (fig. 4*g*). At 11 a.m. on July 8, the sixth morning after the bismuth breakfast, there only remained a faint shadow of the last inch of the transverse colon. All the large intestine below the splenic flexure was visible; the iliac colon was seen to be slightly distended and the pelvic colon and rectum were much distended (fig. 4*h*). At 10.30 a.m. on July 9, the seventh morning, a small length of transverse colon and descending colon could be faintly seen at the splenic flexure. Otherwise only the distended pelvic colon and rectum were visible (fig. 4*i*). At 10.45 a.m. a rectal examination was made. It was found that no anal canal was present; immediately above the anus the finger passed into a distended passage filled completely with moderately firm fæces, which were black owing to the presence of bismuth sulphide. Immediately afterwards an enema was given and a copious evacuation resulted. A quarter of an hour later the patient was again examined with the X-rays and every trace of bismuth shadow was found to have disappeared. Hence the enema not only emptied the rectum but also the colon at least as high up as the splenic flexure.

In fig. 4 the shadows seen at various periods after the bismuth breakfast are reproduced; the shape of the whole colon and the course of the bismuth along it are shown as a composite diagram in fig. 5.

In this case, as in Case I., the bismuth passed through the small intestine at the normal rate. The distance reached in the first twenty-eight hours was also not abnormal. But from the last part of the transverse colon onwards there was considerable delay. After nine days, however, the bismuth had almost completely disappeared from all the intestines except the pelvic colon and the rectum. In this distended part of the gut it accumulated, and, judging from the past history of the patient, it might well have remained there for weeks if an enema had not been given. Hence the chief seat of stagnation was probably in the rectum, and the delay between the splenic flexure and the rectum was secondary. The distended condition of the rectum, the absence of an anal canal with loss of the normal reflex desire to defæcate, and the impossibility of doing so when the attempt was made, show that the constipation was probably due, as in the first case, to anæsthesia of the rectum and anal canal and atony of the muscular wall of the pelvic colon and rectum. It is not improbable that the trouble again originated from the patient's neglect to respond to the normal defæcation reflex, to which was later added her voluntary inhibition of defæcation in order to avoid the pain caused by hæmorrhoids.

It is noteworthy that, in spite of the abnormal shape and situation of the transverse colon, the bismuth passed through it at the normal speed. Hence the discovery of a pelvic transverse colon during an operation for the relief of constipation is no evidence that it is either the cause or the result of the constipation. The abnormal shape and position of the colon in this patient were perhaps due to old chronic peritonitis of pelvic origin, as Mr. Lane has demonstrated that peritoneal bands and adhesions are almost invariably found round similar colons. But the absence of delay in this part of the intestine shows that the adhesions are not due, as has been suggested, to constipation and that they need not necessarily interfere with the normal motor activity of the bowel.

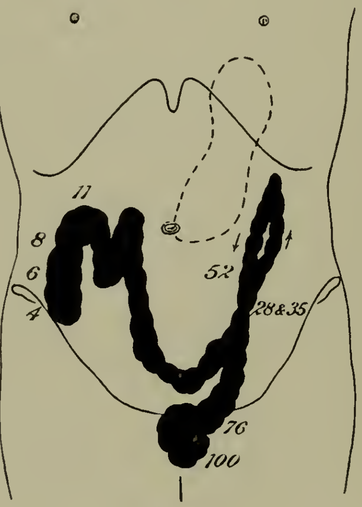


FIG. 5.

Emily H. Severe constipation. Composite diagram of colon to show time in hours at which bismuth reached various parts after the breakfast.

It is clear that this case would have been quite unsuitable for operation. The failure of medicinal treatment and of abdominal massage is also easy to explain, as neither of these measures could affect the only part of the intestines which was really acting abnormally. On the other hand, the fact that the enema given on July 9 completely emptied the abnormal part of the colon showed that a daily enema would be the most rational treatment. That this was true was proved by the success of this measure the only time it was systematically carried out in 1898 when the patient was under the care of Dr. Taylor.

Accordingly every morning after July 9 an enema was given; it had always a good result. Before its administration the patient always tried to defæcate without artificial aid, but never successfully.

On July 16, at 6 a.m., 2 oz. of bismuth carbonate were given. At 10 a.m. the cæcum was not yet visible (fig. 6*a*), but at noon it was clearly seen, together with a small part of the ascending colon (fig. 6*b*). At 3 p.m. the cæcum, ascending colon and first loop of the transverse colon were visible (fig. 6*c*); at 5 p.m. there was no change (fig. 6*d*).

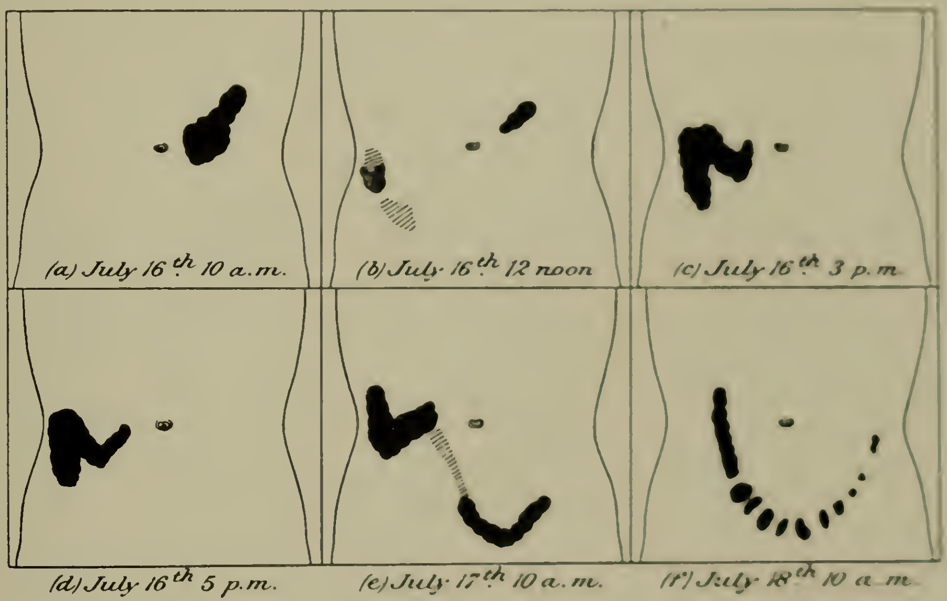


FIG. 6.

Emily H. Severe constipation. Bowels well open by enemata daily since July 9. Bismuth breakfast at 6 a.m. on July 16. At 10 a.m. on July 19, no shadow visible.

On July 17 an enema was given at 6 a.m. with a good result, and at 10 a.m. the cæcum, the first loop and part of the second loop of the transverse colon were visible, but the ascending colon was no longer seen (fig. 6*e*).

On July 18 the stool following the morning enema contained a little bismuth. At 10 a.m. the whole of the second loop of the transverse colon, but nothing else, was visible (fig. 6*f*).

On July 19 an enema was given at 6 a.m. and the fæces passed contained a good deal of bismuth. At 10 a.m. no bismuth shadow could be seen.

Thus with the daily enema the pelvic colon and rectum were prevented from ever becoming distended. The splenic flexure, the descending and pelvic colon and the rectum were never seen; as the enema was always given before the patient was skiagraphed, this must have been due to the fact that, as proved on July 9, the enema emptied the whole of the colon below the splenic flexure. The removal of the mechanical obstruction produced by the accumulation of fæces in the rectum allowed the whole of the bismuth to be cleared out in three days, which is not longer than the period required in some normal individuals. Moreover, the abdominal pain, due no doubt to the efforts of the colon to overcome the resistance offered by the fæcal masses in the rectum, disappeared with this treatment, and the patient felt in every way better.

After July 19, a drachm of magnesium sulphate with ♏ iv. of liquor. strychninæ were given three times a day in addition to the enema. On July 23 bismuth carbonate was again given. It was found that the medicinal treatment led to no acceleration in the rate of the passage of the bismuth through the small intestines. In ten hours, however, the greater part of the second loop of the transverse colon was visible, in addition to the first loop and the ascending colon. Apart from this the bismuth passed along at the same rate as with enemata alone, three days being again required for its complete elimination. Hence the aperient medicine only hastened the passage of the fæces through the first part of the colon, through which it already went with sufficient rapidity. As the patient felt no better when taking the medicine in addition to the enemata than when treated with the enemata alone, all medicines were discontinued. Soon afterwards she was allowed to leave the hospital, with strict instructions to employ an enema every day and to discontinue the use of drugs.

After her return home the patient found that the enema was not always effective. A nurse was therefore sent to help her, as it seemed probable that she did not inject it properly. This proved to be the case, and after a few lessons she was able to give herself an injection, which had a good result every day. As it was followed by some pain if she walked about immediately afterwards, she was instructed to use the enema in the evening just before going to bed. After this she was no longer troubled with the pain, and felt in every way better than she had done for years. But she still complained of some dragging pains in her abdomen, so she was given an abdominal belt with the object of supporting her viscera and preventing the drag on the mesentery, which was probably the cause of her pain. This treatment proved successful. Two months after the treatment was commenced the daily enema was still always effective, and the patient felt and looked very well, but she was quite unable to open her bowels without artificial aid.

CASE III.—CONSTIPATION DUE TO TABES DORSALIS.

Frank P., aged 49, has had the external rectus muscle of his right eye paralysed for six years. Two years ago lightning pains and ataxy developed, and he has now well-marked signs of tabes dorsalis, including some difficulty in commencing micturition. Until a year ago his bowels were regular. During the last year he has become constipated, his bowels being opened only once or twice a week unless he takes medicine, with the aid of which he is able to get a daily action.

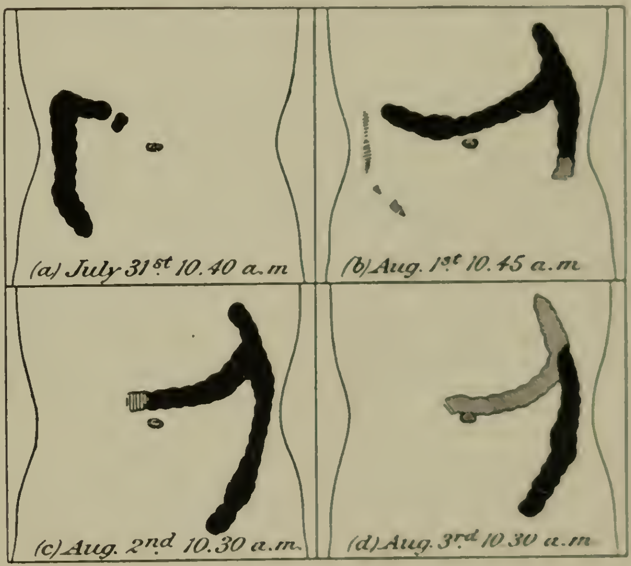


FIG. 7.

Constipation due to tabes dorsalis. Bismuth breakfast at 6.30 a.m. on July 31.

On July 30 the patient's bowels were slightly opened for the first time for a week. On July 31, at 6.30 a.m., 2 oz. of bismuth carbonate were given in bread and milk. At 10.30 a.m. the cæcum, ascending colon, and beginning of the transverse colon were visible (fig. 7*a*). At 4 p.m. the shadow was unaltered except that a little more of the transverse colon was visible.

On August 1, at 10.45 a.m., the cæcum and ascending colon were scarcely visible, the hepatic flexure was filled with gas, and the transverse colon and a small part of the descending colon were clearly seen (fig. 7*b*). On August 2, at 10.30 a.m., the cæcum, ascending colon, and the first half of the transverse colon were quite empty. The remainder of the transverse colon and all of the descending colon were visible (fig. 7*c*). On August 3, at 10.30 a.m., the bismuth had reached no further, but the shadow of the splenic flexure was fainter, and that of the lower part of the descending colon was broader and darker (fig. 7*d*).

In this case the hepatic flexure was passed more rapidly than is usual, but the subsequent progress of the fæces was increasingly slow until the lower end of the descending colon was reached, after which no further advance occurred in twenty-four hours. The diminution in the shadow of the cæcum and ascending colon after one day and its complete disappearance with that of half of the transverse colon in two days were additional indications that the proximal part of the colon was much more active than the distal part.

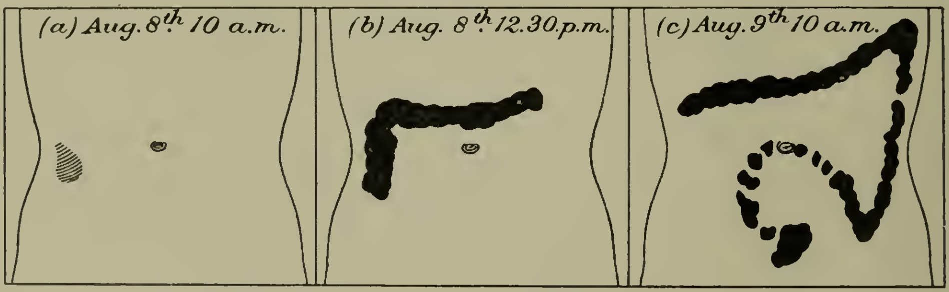


FIG. 8.

Constipation due to tabes under treatment by purgatives. Bismuth breakfast at 6.30 a.m. on August 8.

It is generally held that the vesical symptoms which frequently occur in tabes are due to interference with the afferent nervous impulses which normally pass from the bladder and reach the spinal cord in the posterior roots of the second, third and fourth sacral nerves. It is probable that the afferent nerves from the colon reach the cord by the same roots, but that those from the small intestine reach it in the posterior roots of the ninth to the twelfth dorsal nerves. Although much of the activity of the intestines depends on local action and peripheral reflexes, it is probable that interference with their afferent nerves would lead to a diminution in their motor activity. It is therefore not surprising that the bladder symptoms which occur so frequently in tabes are often associated with constipation, which the observations made in the present case show is due (at any rate sometimes) to deficiency in the movements of the colon, without any change in the small intestine.

If the impaired motility of the colon is due to insufficiency of its innervation, stimuli acting directly on it without requiring the co-operation of the central nervous system should be capable of improving the condition. It is thus found in practice that a diet containing plenty of vegetable food, perhaps with the aid of abdominal massage, often relieves the constipation of tabes, and when these measures fail simple aperients succeed.

After August 3 the patient was given a pill containing a small dose of aloes with nux vomica every evening. He was also instructed to take a diet which left sufficient residue to act as a local stimulant to the colon. The result was that his bowels were opened daily. On August 8 2 oz. of bismuth carbonate were again given at 6.30 a.m. At 10 a.m. the cæcum was just visible (fig. 8*a*) and at 12.30 p.m. most of the transverse colon could be seen (fig. 8*b*). The next morning at 8 a.m. the bowels were opened, and at 10 a.m. the whole of the large intestine from the beginning of the transverse colon to the end of the pelvic colon was visible (fig. 8*c*). These observations showed that the treatment, suggested by theoretical considerations, was successful in practice.

CASE IV.—CONSTIPATION DUE TO LEAD POISONING.

Edwin H., aged 53, was admitted for severe constipation into Guy's Hospital on June 1 under Dr. Fawcett, to whom I am indebted for permission to investigate the case. In the last two years he had had three attacks of severe constipation with abdominal pain and vomiting. On the last occasion (August, 1906) he was in the hospital, where he was quickly relieved by purgatives. After his discharge he remained well with the aid of medicine until April, 1907, when he again became constipated. The constipation became worse, and when admitted on June 1 his bowels had not been opened and he had had severe vomiting for nine days. On admission he was found to have a well-marked blue line on his gums; he was very anæmic, but the constipation was on this occasion not accompanied by any colic. The source of the lead poisoning, which was undoubtedly the cause of the constipation, appears to have been contaminated cider. He was given castor oil on admission and again on June 2, but his bowels were not opened until he was given an enema on June 3. The next day another enema was given with an equally satisfactory result. After this, as the sickness had ceased and there was no abdominal pain, medicine and enemata were omitted for a few days.

On June 6 a bismuth breakfast was given, and the subsequent X-ray examinations showed that the small intestine was to some extent involved in the constipation as well as the colon, as after six hours the cæcum was still invisible, and after eight hours it was only faintly seen (fig. 9*a*). The sluggishness of the colon was well marked, as three hours after the first arrival of the bismuth in the cæcum the shadow was still confined to this part (fig. 9*b*). The next morning, although the bowels were still unopened, the shadow had not reached beyond the proximal limit of the splenic flexure (fig. 9*c*), and six hours later very little further progress had been made (fig. 9*d*). In fig. 9 the shadows seen at the different periods after the bismuth meal are shown; it is seen from them that the cæcum was somewhat distended and abnormally low, and that the transverse colon reached into the pelvis, although the abdominal muscles were fairly strong.

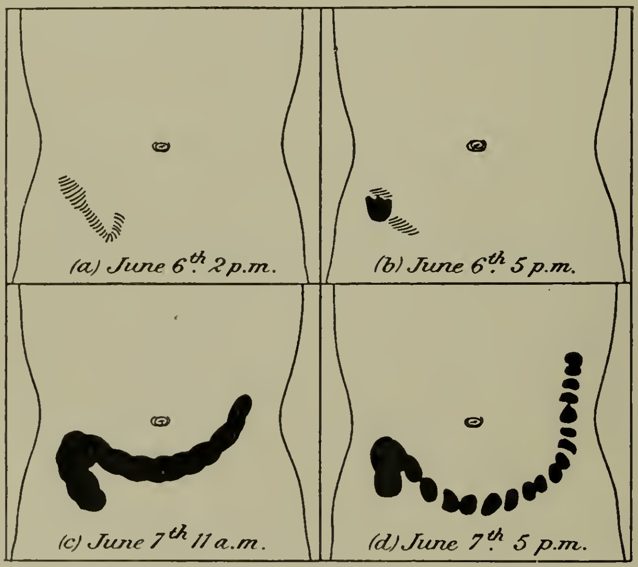


Fig. 9.

Constipation due to lead poisoning. Bismuth breakfast at 6 a.m. on June 6.

It is generally believed that the constipation in lead poisoning is due to the action of the poison on the sympathetic nerves. The inhibitory fibres of the small and large intestines come from adjacent parts of the spinal cord and abdominal sympathetic and from closely related ganglionic centres. This is in sharp contrast with the tracts of the chief motor supply, that for the small intestine being the vagus and that for the colon the sacral nerves. Hence any poison acting on the sympathetic inhibitory fibres would be likely to produce impairment of movement of all parts of the intestine. In the case of lead poisoning, when the abdomen has been opened during life owing to colic being mistaken for peritonitis, parts of the small intestine as well as of the colon have been seen in a tightly contracted condition. Though no narrowing of the colon was noticed with the X-rays, the observations made in this case confirm the view that lead produces constipation by irritating the sympathetic inhibitory nerves of both the small and the large intestines.

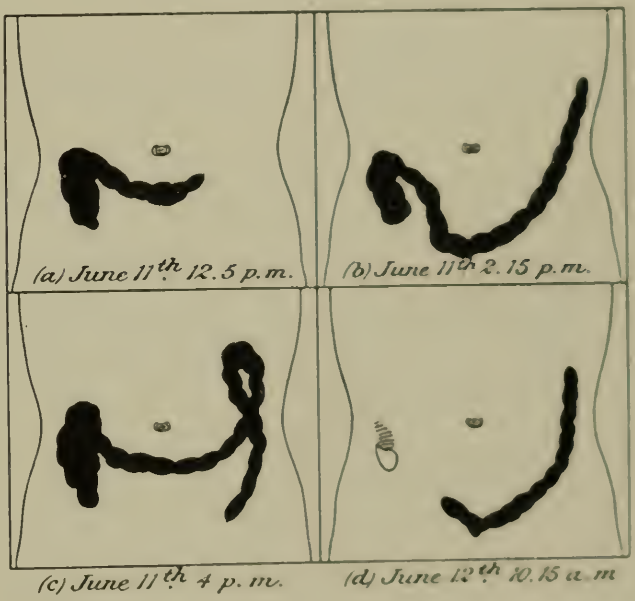


FIG. 10.

Constipation, due to lead poisoning, under treatment. Bismuth breakfast at 6 a.m. on June 11.

The patient was given small doses of cascara sagrada three times daily after June 7, with the result that his bowels were well opened once a day. On June 11 he was again given 2 oz. of bismuth carbonate with his breakfast at 6 a.m. Half an hour later his bowels were opened. At 10.15 a.m. the stomach shadow was very faint, but the cæcum was not visible. At 12.5 p.m. the cæcum, ascending colon and half the transverse colon were visible, and the shadow of the stomach had disappeared (fig. 10*a*). At 2.15 p.m. the transverse colon was visible up to the splenic flexure (fig. 10*b*), and at 4 p.m. the colon from the cæcum to the brim of the true pelvis was marked out (fig. 10*c*). The next morning the bowels were opened at 7 a.m. and a good deal of bismuth was present in the stool. At 10.15 a.m. the shadow of the cæcum was faint, and the only other parts of the colon visible were the descending colon below the level of the umbilicus and the sigmoid flexure, but the amount of bismuth present was not great (fig. 10*d*). Thus the cascara had hastened the emptying of the stomach and caused the activity of both small and large intestines to return to normal.

CASE V.—CONSTIPATION DUE TO CHLOROSIS.

Florrie G., aged 21, was admitted for chlorosis, on July 23, into Guy's Hospital, under Dr. French, to whom I am indebted for permission to investigate the cause of her constipation. She had suffered from indigestion, dyspnœa on exertion, amenorrhœa, œdema of the ankles, and a feeling of slackness for five years, with occasional intermissions. She had been troubled with constipation for the same period, but with the aid of purgatives her bowels were generally opened three or four times a week.

On admission she had a blowing systolic bruit in the pulmonary and mitral areas; a blood examination showed that the amount of hæmoglobin present was 42 per cent. of the normal, but that the number of red corpuscles was slightly greater than normal, so that the colour index of the blood was about $\frac{1}{3}$. She was given iron and arsenic; her general condition improved steadily and the amount of hæmoglobin rose in a week to 55 per cent. The constipation remained unaltered, and on August 6 aperient pills were discontinued in order that the seat of the delay in the passage of fæces through her intestines might be ascertained. A bismuth breakfast was given at 9.15 a.m. on August 8. The cæcum was reached in four and a half hours (fig. 11*a*) and the middle of the transverse colon two hours later (fig. 11*b*), so that up to this point the rate of progress was normal, but in the next twenty-four hours an advance of only 2 in. or 3 in. was made, as at 10 a.m. on August 9 the splenic flexure had not yet been reached, and at 4.30 p.m. the shadow was the same as at 10 a.m. (fig. 11*c*). On August 10, at 10 a.m., the cæcum was no longer visible and the ascending colon was very faint. All the transverse colon and descending colon and most of the sigmoid flexure were visible (fig. 11*d*). Thus in this case the constipation was due to the sluggish action of the part of the large intestine beyond the middle of the transverse colon.

If this case proves to be typical of the constipation of chlorosis it is easy to understand why ordinary aperients are able to relieve it, as the sluggish action occurs in a part of the intestines which is readily influenced by them.[1]

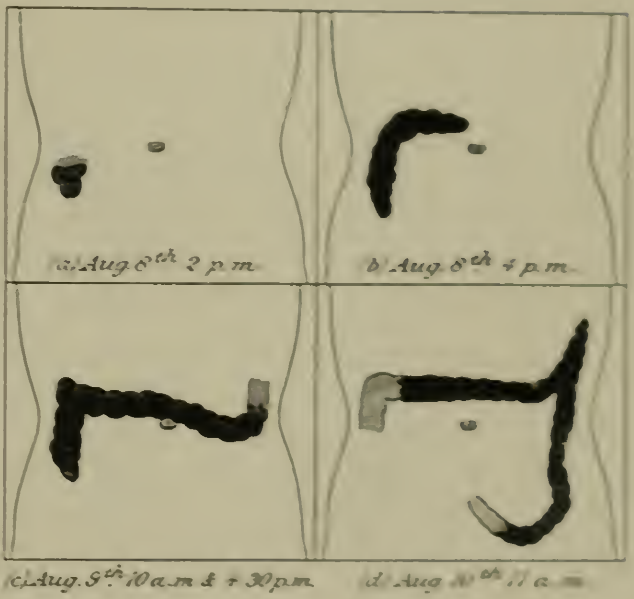


FIG. 11.

Constipation due to chlorosis. Bismuth meal at 9.15 a.m. on August 8.

It is generally agreed that aperients should be discontinued as soon as possible, as the disappearance of the anæmia and the return of a more healthy appetite are generally associated with a marked improvement in the action of the bowels. But some further observations made in this patient show the importance of giving only just sufficient aperients to produce one normal stool a day.

On August 10 she was ordered a small dose of cascara sagrada, with magnesium sulphate, in addition to the iron and arsenic she was already having for her anæmia. By this means her bowels were opened twice every day, the stools being copious and soft. After this treatment had been continued for a few days 2 oz. of bismuth carbonate were given at 6 a.m. one morning. The same day at 12.30 p.m. the greater part of the bismuth had reached the rectum, although at 6 p.m. a faint shadow was still visible in the descending colon. Hence the action of the intestines was unduly vigorous. Food passing so rapidly through the intestines could not be subjected for a sufficient period to the action of the digestive juices, and absorption would certainly be deficient. Hence, though the constipation was relieved, the nutrition would have suffered if the dose of the aperients had not been reduced.

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[1] Two cases of constipation associated with chlorosis, examined more recently, showed the same type of intestinal delay.

CASE VI.—CONSTIPATION WITH ENTEROPTOSIS.

Emily C., aged 37, was admitted into Guy's Hospital under my care for abdominal discomfort and frequency of micturition. She has had seven children, the youngest of whom is seventeen months old. She has suffered from indigestion and been constipated for many years, but her bowels are opened with the aid of medicine every other day. On examination she was found to have feebly developed abdominal muscles; the right kidney was freely movable and rather enlarged. Examination by means of the cystoscope and segregator showed that there was some cystitis and that pus was present in the urine from the right kidney. No tubercle bacilli were found, but as her opsonic index for tubercle bacilli was 0·5 a diagnosis of tuberculous kidney was made.

She was given a bismuth breakfast after all aperients had been discontinued for two days. The X-ray examinations showed that the cæcum and beginning of the transverse colon were reached in normal time (figs. 12*a* and 12*b*). Twenty-eight hours after the breakfast, though she was on full diet and her bowels had not been opened, the shadow had not reached beyond the centre of the transverse colon (fig. 12*c*), and very little progress was made in the next six hours (fig. 12*d*). On the third morning, fifty-four hours after the meal, the cæcum and ascending colon were no longer visible and the whole of the transverse colon was filled, but the bismuth had not yet reached beyond the splenic flexure (fig. 12*e*). The X-rays also showed that the cæcum was situated below the rim of the true pelvis, the "hepatic flexure" was on a level with the umbilicus, and the transverse colon reached deeply into the pelvis.

In this case the weak abdominal muscles were probably the chief factor in the production of the constipation. The normal intra-abdominal pressure depends largely on the condition of the abdominal muscles. When these are weak the pressure falls, so that the gas present in the intestines expands and the intestines become dilated. The larger the lumen of a muscular tube the greater is the force required to produce a given increase in pressure within it. Hence the muscles of the intestines, when the abdominal wall is flabby, have to contract with unusual force in order to maintain the normal rate of progress of the fæces.

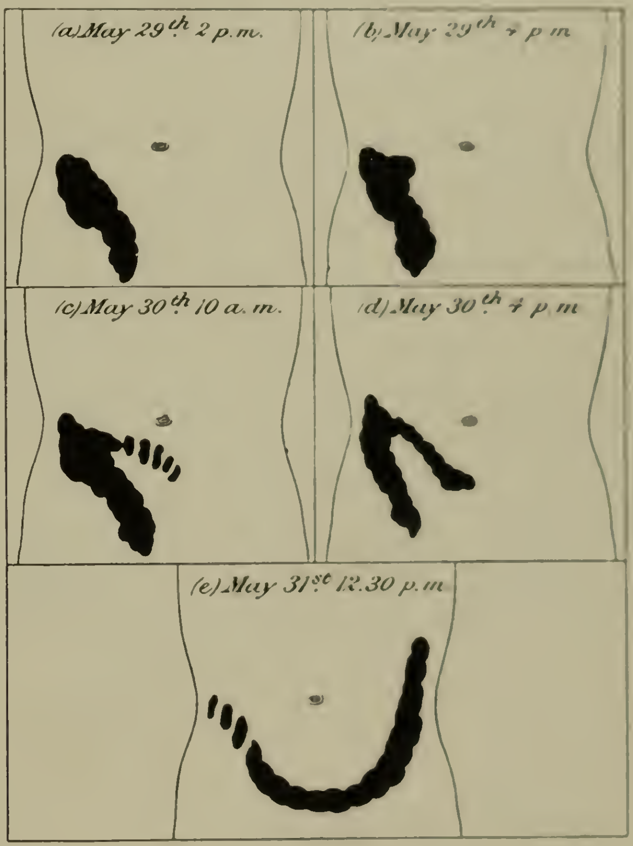

FIG. 12.

Constipation with enteroptosis. Bismuth meal at 6.30 a.m. on May 29.

Owing to the presence of tuberculous disease in the body the diminution in abdominal pressure was in this case probably associated with a diminution rather than an increase in the strength of the intestinal muscles, which would therefore become still less capable of performing their functions satisfactorily.

Constipation in similar cases has often been ascribed to the enteroptosis itself, but the abnormally low position of the cæcum, hepatic flexure, and transverse colon, which is in all probability secondary to the weak abdominal muscles, cannot by itself produce constipation. I have found the colon quite as low as in this patient in individuals with strong abdominal muscles, whose bowels were perfectly regular and in whom the movements of the intestinal contents, traced by the X-rays, were normal. Moreover, the greatest delay occurred in the transverse colon, so that this constipation, associated with enteroptosis, cannot be due, as has frequently been suggested, to kinking of the intestine at the hepatic or splenic flexure.

Thus in the treatment of this case attention had first to be paid to the condition of the abdominal muscles. The patient was instructed to perform suitable exercises twice daily; she was also provided with an abdominal belt, to be worn until the condition of the muscles was sufficiently improved to render its use no longer essential. It should be noted that the belt was not given in order to lift the colon back to its normal position, but in order to increase the abdominal pressure. At the same time the tuberculous kidney is being treated by injections of tuberculin and the patient is living an open-air life. If the kidney disease gets cured the general condition of the patient will be so much improved that an important contributory cause of the constipation will be removed. Finally, it will be necessary, at any rate for the present, to produce an artificial stimulation of the colon by means of aperients.

Case VII.—Constipation of Unknown Origin.

Michael W., aged 48, was admitted under my care into Guy's Hospital on August 6. Until two years ago his bowels had been perfectly regular. For no obvious reason he then began to be constipated, the trouble becoming steadily worse. During the last six months he has been under medical treatment, but even with the aid of purgatives his bowels have been opened only two or three times a week. For a year the hard scybala which constitute his stools have been coated with mucus, but no blood has been passed. He has had some abdominal pain and has been losing weight.

On admission hard fæces could be felt in the transverse colon, descending colon, and iliac colon. No peristalsis was visible. By rectal examination nothing abnormal was found: the lower part of the rectum was quite empty and rather ballooned, but some hard fæces could be felt high up. An enema was administered with a good result, no fæces being any longer palpable in the colon. The patient was given a full diet but no purgatives. On August 9, 2 oz. of bismuth carbonate were given at 6 a.m. in a bowl of bread and milk. At 10 a.m. the cæcum was just visible (fig. 13*a*). At noon the whole of the ascending colon could be seen (fig. 13*b*). Up to this point the rate of progress had been normal, but four hours later the shadow was unaltered. At 11 a.m. the next morning (August 10) the cæcal shadow was less obvious. Nearly all the bismuth had collected in the ascending colon, only the first 2 in. of the transverse colon being faintly visible (fig. 13*c*).

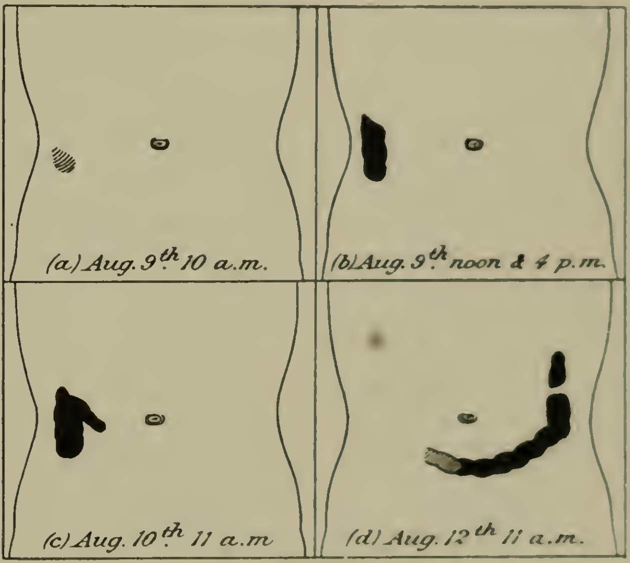

FIG. 13.

Constipation of unknown origin. Bismuth breakfast at 6 a.m. on August 9.

On August 11 the bowels were opened slightly without the aid of medicine; no X-ray examination was made. On August 12, at 11 a.m., seventy-seven hours after the bismuth breakfast, the shadow of the cæcum and ascending colon was no longer visible and that of the first half of the transverse colon was faint. The distal half of the transverse colon now contained almost all the bismuth, none having reached beyond the splenic flexure (fig. 13*d*). Two colocynth and hyoscyamus pills were given in the evening of August 12, and an enema the next morning. The bowels were well opened, and on subsequent examination with the X-rays it was found that all the shadow had disappeared.

In this case there was considerable sluggishness of the colon beyond the hepatic flexure. There was nothing in the shadows pointing to the presence of any organic obstruction, so a diagnosis of chronic constipation of the colon of unknown origin was made.[1]

The mucus the patient had passed with his fæces was probably produced by catarrh, caused by the irritation of the hard fæces retained in the colon. The recent want of success in the use of purgatives can best be explained by the accumulation of hard fæces in the large intestine before the treatment was begun, so that a considerable mechanical obstruction was present which purgatives could not completely overcome, even in doses sufficient to produce painful contractions. As the retained masses had now been removed by enemata, treatment by purgatives seemed likely to be successful, and it was found that moderate doses of magnesium sulphate, with cascara sagrada, were sufficient to produce a daily evacuation of normal fæces, without mucus.

The importance of beginning treatment with an enema before using purgatives is not always remembered, although it was first pointed out by Stephen Hales nearly 200 years ago. After describing experiments which show that water, poured into the alimentary canal of a dog, under 2 ft. of pressure, flows out of the anus if the fæces are of normal consistency, he writes that "when in another Dog a Tube was fixed to the Gullet, and Water was poured in so as to burst the Stomach and one of the Guts, yet there being hard Fæces in the Rectum, no Water passed thro' it. From this Experiment we see how requisite it is, in some colicky Obstructions of the Bowels, to promote the Operation of Purgatives with Clysters; without which, Purgatives may in some Cases do more harm than good, while they increase the painful Distension of the Bowels, without being able to pass and carry off the noxious Mass."[2]

A week after the patient's discharge he was feeling much better; his bowels were acting regularly and no more mucus had been passed.

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[1] The patient's fæces were also examined for "occult" blood whilst he was kept on a meat-free diet for a few days. None was found, thus making the absence of any malignant disease of the intestine still more probable.

[2] Stephen Hales: "Statical Essays: containing Hæmostaticks," London, 1733, p. 184.

CASE VIII.—CONSTIPATION WITH NEURASTHENIA.

Annie A., aged 31, was sent to me on May 29 in the Electrical Department for neurasthenia, which had been brought on by domestic troubles a year ago. She was depressed, languid, and much troubled with palpitation. She was very constipated and, in spite of the daily use of purgatives, three or four days sometimes elapsed without her bowels being opened. She was treated with static electricity and steadily improved. By the beginning of July she was able to resume her old occupations and felt almost well, but she was still as constipated as ever.

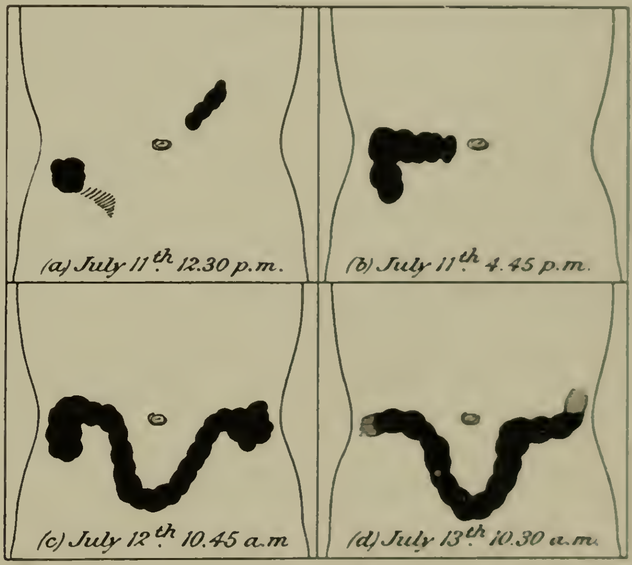

FIG. 14.

Constipation with neurasthenia. Bismuth breakfast at 8 a.m. on July 11.

On July 9 her bowels were opened, but after this no medicine or enemata were given for some days. On July 11 she took 2 oz. of bismuth carbonate in bread and milk at 8 a.m. At 11 a.m. the shadow of the stomach was seen with the X-rays to be normal in size and position. At 12.30 p.m. the cæcum became faintly visible and there was still some bismuth in the stomach (fig. 14*a*). At 2.45 p.m. the stomach was almost empty and the cæcum quite obvious. At 4.45 p.m. the cæcum, ascending colon and a small part of the transverse colon were seen (fig. 14*b*). Up to this point progress had been normal. The next morning (July 12) at 10.45 a.m., the cæcum, ascending colon and the greater part of the transverse colon were visible (fig. 14*c*). The cæcum was normal in position but the transverse colon reached deeply into the pelvis. On the third morning, seventy-five hours after the bismuth breakfast, the cæcum and ascending colon had become faint, but the shadow had only extended a little further than on the previous morning, the splenic flexure being still invisible (fig. 14*d*).

Thus the constipation in this case depended on sluggish action of the colon beyond the hepatic flexure, the last part of the transverse colon being most at fault. This was probably due to the general depression of the nervous system, as the onset of the constipation coincided with that of the other neurasthenic symptoms. The patient was ordered ♏iij. of liquor. strychninæ with ʒj. of magnesium sulphate, to be taken three times a day. With this treatment the bowels became quite regular, and a subsequent examination with the aid of the X-rays, after a bismuth meal, showed that the intestinal contents moved along at the normal speed. The patient was instructed to take a suitable diet and gradually to diminish the amount of medicine she was taking. It is probable that when her general health condition improves still further she will be able to discontinue the use of medicine. When last seen, at the end of July, she was only taking the medicine twice a day.

DISCUSSION.

Dr. Morley Fletcher offered his congratulations to Dr. Hertz for his most interesting paper, and desired to ask him how he explained the complete absence of shadow during the passage of the bismuth carbonate through the small intestine. It was remarkable that its presence should not be revealed by the X-rays. Secondly, he asked what was the position of the patient during the taking of the X-ray photographs—whether an upright or a horizontal posture was employed.

Dr. C. E. Beevor said the details given by Dr. Hertz had been most interesting, especially where there had been a definitely ascertained cause for it, as in the case of the young girl. He asked how the author explained those cases of constipation which came on between the fiftieth and sixtieth years of life in people who were otherwise in good health, and in whom there was no such cause as Dr. Hertz gave in some of his cases. A man found, on reaching a certain age, that he had some difficulty in defæcation, and took purgatives as a remedy, but he found it necessary to continue taking them or to use enemata.

Dr. DE HAVILLAND HALL said he had been very glad to hear the explanation of some of the conditions associated with chronic constipation, and what he had heard recalled to his mind a case which he saw with his friend, Mr. Goodsall, twenty years ago, in which the condition was chronic constipation with piles. Mr. Goodsall operated on the hæmorrhoids, and in order to avoid constipation in future he advised the use of an enema, saying that the proper treatment for cases of chronic constipation associated with atony of the lower bowel was the use of enemata, and he laid stress on the enema being administered at night. That advice he had himself repeated in similar cases, and was glad to hear of the author's case, in which the substitution of an enema at night for one in the morning had so greatly increased the patient's comfort.

Dr. HERTZ, in reply, said it was not accurate to say the shadow was never seen in the small intestine; one occasionally saw a diffuse shadow in various parts, particularly in the pelvis, which he supposed was from the small intestine. It was not seen more definitely because there was such a large area of bowel over which a small quantity of bismuth was distributed. The cæcum was visible before the stomach was empty, so that at a certain moment there was some bismuth in the cæcum and some in the stomach; hence the amount at any one spot must be very small. When by chance some bismuth was concentrated in one part of the small intestine it became visible, and in such circumstances something happened which was very interesting to watch, namely, what Cannon described as "segmentation." That authority discovered that peristalsis was not the only movement in the intestine, and he observed by means of bismuth in cats that when a portion of small intestine was filled, a mass became divided into two, then each of those parts divided again, and then the central ones joined up again. That went on without pushing forward the food, the object, no doubt, being to bring every part of the contents in intimate contact with the digestive juices and so render digestion more thorough. He, Dr. Hertz, had seen the process some half dozen times in human beings. The X-ray pictures were taken with the patient lying on the back, but now that Guy's Hospital possessed an apparatus which would enable the X-ray examination to be made in the vertical position, he should use that, because the upright position was a more normal one, and in the case of enteroptosis it would be possible to see what amount of dropping there was. With regard to the cases in which constipation came on in people otherwise healthy, aged between 50 and 60, he had not examined such by means of bismuth, but he thought that in them the same sort of thing would be found as in the neurasthenic cases, *i.e.*, a diminution in the rate through the colon, due, perhaps, to a slight blunting of activity in the muscles and a diminished response of the mucous membrane to the reflex. Thus a stronger stimulus, that is to say a purgative, was required to cause an action of the bowels.

Demonstration of the Use of the Kinematograph in Medicine.

By H. Campbell Thomson, M.D.

Dr. Campbell Thomson gave a demonstration to show the utility of the kinematograph in the teaching and recording of cases of nervous disease. Bioscopic illustrations of various phases of different diseases of the nervous system were shown upon the screen, and clear pictures were obtained of the movements occurring in tremors, athetosis, nystagmus, different types of gait, and in the elicitation of various physical signs, *e.g.*, the knee-jerks, ankle-clonus, and the Babinski response.

Medical Section.

February 25, 1908.

Dr. SAMUEL GEE, President of the Section, in the Chair.

The Acute Suffocative Catarrh of Laennec and other conditions from which it should be distinguished.

A Typical Case associated with a Peculiar Bacillus.

By SAMUEL WEST, M.D.

SUFFOCATIVE catarrh is a term often used in a vague way to describe cases which have the two features in common, pulmonary catarrh and suffocative dyspnœa. The name was invented by Laennec to denote an affection rare but characteristic enough. It is as little recognised, it would seem, in the present day as it was when Laennec first described it.

The following is Laennec's original description, which can hardly be improved on: The disease is an acute catarrh affecting the whole of a very large portion of the mucous membrane of the lungs. Its duration is from twenty-four to forty-eight hours, or at the most some days. At the end of this time either the patient dies or expectoration commences and puts an end to the suffocation, and the disorder then follows the course of simple acute catarrh. While the suffocation lasts there is but little cough, and the expectoration, if any, is altogether pituitous or fluid; it retains this character for some days at least and then becomes more abundant; but recovery sometimes takes place without its ever becoming properly mucous, in which case the disease is only a variety of the acute bronchial phlegmorrhagy or pituitous catarrh. When, on the other hand, the expectoration becomes mucous, the disease is simply an ordinary acute catarrh, in which the suffocative character of the invasion is caused by the extent of tumefaction of the bronchial membrane, and by the great quantity of fluid excreted at once.

Laennec further states that it is very rare in adults, and for this reason had escaped the attention of physicians.

In fatal cases the autopsy shows little morbid change: the lungs are somewhat congested and the tubes contain more or less (often only quite a small amount) frothy fluid.

Laennec's opinion seems to be the correct one, that the urgent symptoms are due to the rapid tumefaction of the mucous membrane of the medium- and small-sized bronchi. It is interesting to remember that similar symptoms may arise as the result of the inhalation of violently irritant vapours, such as bromine and iodine. The following case is a typical instance of the affection, and the bacteriological examination suggests that in some instances, at any rate, the exciting causes of the irritation may be a bacillus :—

Acute Suffocative Catarrh associated with peculiar bacilli of indefinite nature (diphtheroid).—On October 24 a young man, aged 23, was admitted into the hospital deeply cyanosed and suffering with great dyspnœa. It transpired that he was a strong young man and had been in perfect health until about thirty-six hours before, when he felt some tightness and constriction round his chest, and his breathing became short. He struggled on with his work for one day, and during the next night became so much worse that he was brought to the hospital in the early morning and admitted at once as an urgent case, with the diagnosis of pneumonia. On examination in the ward, in spite of the extreme dyspnœa and cyanosis, which were so severe that the patient seemed in imminent risk of suffocation, no physical signs could be found in the chest except rhonchus and sibilus. The temperature was 101° F., the respirations 36, and the pulse 120. The clinical condition was altogether unlike that of pneumonia, nor was it or the respiration like that of asthma. There was no laryngeal or tracheal obstruction. The case suggested most that form of acute miliary tuberculosis in which the whole lung is stuffed with tiny tubercles, and where the physical signs bear no relation to the general distress and dyspnœa. Such diagnosis, however, was not consistent with the history obtained of the illness. The usual remedies were applied and the patient improved rapidly, so that by the next day he was out of danger, though still suffering from shortness of breath. The temperature had fallen to 97·8° F. and the pulse to 80. The cyanosis was still well marked. Crepitation appeared in the chest, and a little mucoid sputum was coughed up. The next day, October 26, the sputum was more abundant. I had a bacteriological examination of it made, and the report was: "A few pneumococci, but very large numbers of a diphtheroid bacilli of uncertain nature. Cultivation yielded nothing but a coliform bacillus." From this time the chest began to improve, moist sounds became more abundant, the expectoration increased, but was never more than scanty, and the general symptoms—dyspnœa and cyanosis—became rapidly less. In about forty-eight hours from the time of admission every urgent symptom had passed away, and nothing more remained than what might be called slight bronchitis. The patient did not, however, convalesce as rapidly as might have been expected, the physical signs did not clear up completely, and an amount of prostration and feebleness continued which was altogether out of proportion to the apparent mildness of the bronchitis. The sputum was again examined bacteriologically on November 22, *i.e.*, just a month from the onset of the illness, and still contained the same bacilli. The report was: "Pneumococci present and *Bacilli coli communis*, both in small numbers. Gram positive bacilli, diphtheroid in appearance, were still numerous." Ultimately the patient made a good recovery and was sent home at the beginning of December.

The case recorded tallies in all points with Laennec's description. The only new fact is its association with the peculiar diphtheroid bacillus. As similar cases occur in association with the pneumococcus the question may fairly be raised whether the acute symptoms do not depend upon these bacilli and their wide dissemination through the bronchial tubes.

The following conditions are such as are either likely to be confused with the true suffocative catarrh of Laennec or else present interesting relations with it:—

(I.) Acute suffocative pulmonary œdema or, as it has been termed, acute non-inflammatory congestion of the lungs.

(II.) Certain acute inflammatory conditions.

(1) Capillary bronchitis.
(2) Secondary broncho-pneumonia.
(3) Acute congestion or, as I should call it, primary broncho-pneumonia.
(4) Certain cases in the early congestive stage of acute pneumonia.

(III.) Lastly, collateral fluxion and physiological breakdown or respiratory failure are conditions which stand in an interesting relation with it.

(I.) ACUTE SUFFOCATIVE PULMONARY ŒDEMA.

The acute congestion is in these cases due to sudden failure of the heart, and this group falls naturally into two divisions according as there has been antecedent morbus cordis or not.

(1) *With Antecedent Morbus Cordis.*

The simplest instance to take is a case of mitral disease. Here, owing to the obstruction at the mitral orifice, the lungs are always pathologically congested, *i.e.*, contain more blood than they normally should. When from any cause, and it may be only a slight cause, the obstruction is in any way increased, exudation will take place from the vessels into the lung and will give evidence of its occurrence by wheezing and crepitation, *i.e.*, by the signs of bronchitis. In most instances the extra-obstruction is slight and the signs of bronchitis not severe. But the gravity of the symptoms depends upon the degree of extra-obstruction and the rapidity of its development, and when these are great the symptoms will be urgent, even to the extent of suffocation. Of this the two following cases are good illustrations, the first occurring in the course of disease of the mitral valves and the second of the aortic valves.

Acute Œdema of the Lungs in a Case of Mitral Disease; death in seventeen hours; autopsy.—Henry W., aged 12, a strong, healthy child, went to bed well but woke up an hour later crying with pain in the pit of the stomach and bringing up some "congealed blood" from the mouth. He was taken at once to the hospital, spitting up blood on the way and vomiting several times. When seen he was found to be much cyanosed, suffering with great dyspnœa, gasping for breath, constantly coughing up bright red frothy blood, and groaning with pain over the præcordium. The pulse was 120, the respirations very rapid, and the temperature 96° F. Loud, coarse crepitation was heard all over the chest, but there was no dulness to percussion or bronchial breathing. The apex of the heart was displaced 2 in. outwards, the cardiac dulness increased upwards and to the right, and a loud presystolic murmur was audible. During the night the symptoms grew steadily worse, the spitting of blood continued, and the lad died of suffocation seventeen hours only from the onset of his illness. At the autopsy the heart showed well-marked mitral stenosis, the lungs were extremely congested and œdematous, and the air tubes contained much blood-stained fluid like that which had been expectorated. Microscopical examination showed the ordinary appearances of "heart lung," but in addition the alveoli and small bronchi were filled with a turbid coagulable fluid, containing numerous cells, both epithelial and lymphatic, as well as blood.

Acute Œdema of the Lungs due to sudden failure of the Left Ventricle in a case of Double Aortic Disease ; free venesection ; recovery.—A man, aged 40, was admitted into the hospital with double aortic disease, &c. All at once extreme dyspnœa set in with rapidly increasing cyanosis. Wheezing and crepitation developed over the lungs and the patient began to spit up blood-stained sputum, which soon became almost pure blood. The symptoms were so urgent, and suffocation so threatening, that venesection was performed, and 30 oz. or more of blood rapidly removed from the arm. As the blood flowed the colour improved, and in an hour or two all urgent symptoms had passed off. Desperate as the case seemed at the time, the patient recovered from the attack and lived for more than three months, dying at the last of gradual heart failure. The amount of hæmoptysis and its sudden onset might have been explained by infarct, but the rapidity with which the symptoms subsided after the bleeding proved the diagnosis of acute congestion due to the sudden failure of the left ventricle to be the correct one ; the venesection no doubt saved the patient's life.

(2) *With no Antecedent Morbus Cordis.*

Acute œdema of the lungs consequent upon sudden cardiac failure is the actual cause of death in many cases of hyperpyrexia and of grave septic fevers, especially those with high temperature, such as typhus or malignant scarlet fever.

Acute Pulmonary Œdema in a case of Hyperpyrexia : cold baths : temporary relief ; death.—A man, aged 36, was the subject of an ordinary attack of rheumatic fever. After a few days, when he was apparently convalescent, the temperature began to rise and rapidly reached 108° F. After about three hours or so I saw the patient and found him quite unconscious, with noisy rattling all over the chest, and apparently moribund. He was at once placed in a cold bath ; after a few minutes he came to himself so that he could answer questions. The heart became several beats slower and the noisy rattling over the chest disappeared. He was kept twenty minutes in the bath, when he complained of feeling cold and was transferred to bed. The temperature rose again in an hour and the rattling returned. Again he was put into the cold bath, and the rattling disappeared. He had several baths with the same result, but in the end he died of exhaustion.

(II.) ACUTE INFLAMMATORY CONGESTION.

It is among the inflammatory group of congestions that the other affections are found which are more commonly confounded with suffocative catarrh. *Capillary bronchitis* and the *secondary broncho-pneumonia*, though often attended by severe dyspnœa and cyanosis, are usually so evidently consecutive to bronchitis as to give rise to little confusion, though when such cases end with suffocation they have been called suffocative catarrh. But the distinction is clear, for the attack begins as an ordinary bronchitis, which spreads gradually, with more or less rapidity, to the smaller tubes, the symptoms increasing in severity as the disease progresses, and death often comes more by heart failure than by suffocation.

It is the other form of broncho-pneumonia, the *acute primary*, presumably pneumococcal, form, or, as it has been called, *acute congestive broncho-pneumonia*, that is most closely allied to suffocative catarrh. There is also probably a form of *pneumococcal* bronchitis of great intensity and mortality, and, as the case which forms the basis of this paper suggests, acute suffocative catarrh may really be an acute bacterial bronchitis of pneumococcal or some other origin. The onset in both these cases is very sudden as in other pneumococcal inflammations, and if the affection be general or widespread the symptoms may be very severe and well deserve the name of suffocative catarrh. Indeed, it is to this group that I am inclined to refer Laennec's acute suffocative catarrh.

Finally, in this connection a remarkable group of cases deserves mention in which pneumonia begins in a peculiar way: *diffuse congestion stage of acute pneumonia*. Dyspnœa is urgent from the onset, and examination shows widespread congestion of one lung and possibly secondary congestion of the other. If death happened now the case might be not incorrectly described as suffocative catarrh.

At first there is no expectoration, but after an hour or two it may appear and be more or less blood-stained. Sometimes there is so much blood that the attack might be described as commencing with profuse hæmoptysis. If life be preserved the local lesions develop, and as one lobe becomes consolidated the congestion of the other parts passes off and the hæmorrhage ceases. The condition of the lungs may be compared with what is sometimes observed in a furuncular inflammation of the skin. This may set in with an inflammatory œdema, which rapidly involves a wide area, for example the whole forearm from knuckle to elbow, yet the boil which ultimately forms may not be larger than a shilling, and as the local inflammation develops the widespread inflammation and œdema subside. The following is a case of the kind:—

Acute General Congestion of One Lung, with Hæmoptysis, ending in Apex Pneumonia, in a Case of Mitral Stenosis.—A lady, aged 35, who had mitral stenosis of many years duration, was attacked one evening with high fever and great dyspnœa. The dyspnœa was so severe that her life seemed in danger. The only physical signs were those of acute congestion of the whole right lung. She immediately began to expectorate pure blood, bright and frothy, and brought up several ounces in three or four hours with considerable relief. Gradually the signs of general congestion subsided and became limited to the top of the upper lobe, when the ordinary signs of acute pneumonia subsequently developed. In spite of the acute and alarming onset the pneumonia ran an ordinary course and terminated on the fifth day. The patient then made a rapid recovery.

(III.) COLLATERAL FLUXION—RESPIRATORY FAILURE.

In close relation with acute suffocative congestion those cases may be also considered in which the respiratory symptoms are due to collateral fluxion or pulmonary failure. The conditions are interesting, though not likely to be in any way confounded with suffocative catarrh, as they are so obviously secondary to some other affection. When, as in cases of pleuritic effusion, the fluid forms gradually, so that time is given to the heart and lungs to accommodate themselves to the altered conditions, the opposite lung may for long remain equal to the extra work demanded of it. Still the margin is small and may easily be overstepped; the extra work may easily pass into overwork, and so soon as this occurs the signs of bronchitis appear. Thus the appearance of the signs of bronchitis on the sound side is an indication for immediate paracentesis. A similar condition may arise in connection with abdominal distension, *e.g.*, in acute peritonitis, acute tympanites, or in ascites, the lower parts of both lungs being thus compressed from the pressure of the diaphragm upwards, and so again dyspnœa may arise and quickly become urgent.

If, as in a case of pneumothorax, the heart and lungs have no time to adjust themselves, the signs of respiratory failure appear at once, so that in a few minutes, or at any rate in an hour or two, death may occur from suffocation.

In this connection may be mentioned also those cases of acute pneumonia in which, during the active stage of the disease, the signs of bronchitis develop in the opposite lung. These signs indicate physiological failure and are of very grave significance, for as so little can be done to relieve them the condition becomes rapidly worse and worse till death ends the struggle. In a bad case of pneumonia the respiratory failure is not a problem of such simplicity as has just been represented, for the respiratory and cardiac nerve centres, as well as the heart and respiratory muscles, are themselves affected by the high temperature, and more especially by the pneumococcal toxins, but they all work together towards the same end.

CONCLUSIONS.

Laennec's suffocative catarrh is a peculiar and characteristic affection, rare, especially in the adult, and not generally recognised as a clinical entity.

It has to be distinguished from capillary bronchitis and disseminated post-bronchitic broncho-pneumonia.

More closely resembling it are primary broncho-pneumonia, *e.g.*, disseminated pneumococcal pneumonia, and possibly an acute pneumococcal or other bacterial bronchitis.

In association with it may be placed (1) those cases of acute pulmonary œdema which develop in the course of chronic heart obstruction or of acute heart failure, (2) the cases of collateral fluxion which have been described, and (3) lastly, those cases of pneumonia which commence with widespread pulmonary congestion.

A careful bacteriological examination of the sputum should be made in all cases of suffocative catarrh as being likely to throw light upon the true nature of the affection.

DISCUSSION.

The PRESIDENT (Dr. Gee) said he thought Fellows would agree that they had little or no knowledge of any disease until they had seen a case of it. He had been a great reader of Laennec, and no doubt he had read that authority's description of acute suffocative catarrh, but the first case of it he ever saw taught him a lesson. The patient was a gentleman in the prime of life, a robust, healthy man, who was suddenly seized with a cough. He saw him only once, within twenty-four hours of the beginning of his illness, and assumed it was a case of ordinary bronchitis, as there were signs of that, and he expressed the opinion that in the course of a few weeks he would be quite well. But he died in forty-eight hours. Such a case was extremely startling to the friends of the patient and taught a very useful lesson to the physician. Since that time he had felt very loth to express any opinion as to the future course of any case of apparent bronchitis at the beginning. Before coming to the meeting he refreshed his memory by looking up Laennec's book, and his description did not occupy more than about thirty lines. It was a perfect model of clearness, completeness and conciseness.

Dr. WETHERED said that one occasionally came across such cases as Dr. West had referred to, and they were puzzling. Perhaps those connected with heart disease were the most common, and one or two he had seen had terminated in the same way. But other cases were not quite so clear, and he asked the author whether he associated those cases with suffocative bronchial catarrh which sometimes occurred after an operation. He remembered a gentleman, aged 40, who was operated upon for some obscure bowel condition, which was found to be malignant disease. Ether was the anæsthetic employed. In twenty-four hours there were pulmonary symptoms, and in forty-eight hours he died with the symptoms which Dr. Samuel West had referred to. He did not know whether such cases were allied to those Dr. West had mentioned. There was another class of case, referred to chiefly in French literature, occurring in men who went down to clear out cesspools, picking off the crust which had formed. In a case which came before the French courts, three men had been down a cesspool, and in a few hours they were seized with the symptoms of urgent dyspnœa and died in about twenty-four hours. The question before the court was whether their relatives could claim insurance from their employers for submitting them to those influences.

Dr. WILLIAM EWART commented upon the heterogeneous etiology of the cases, which was not suggestive of that separate and distinctive identity which had been claimed for the affection. This criticism he subsequently withdrew when he understood that, with one exception, the cases narrated were brought up, not as illustrations, but as contrasts. Speaking under a mistaken impression he had insisted upon the fact that bronchial collapse might be brought about in a variety of ways. He was familiar with the sudden accession of suffocative catarrh; but it had interested him less from the point of view of causation than from that of treatment. What was best to be done in the face of such an occurrence? was the practical question. Dr. West apparently saved one of his cases by bleeding. This had been successful in his own hands: he never failed to call to aid artificial respiration of the expiratory kind. The special feature and the danger in the condition under discussion was bronchial failure. The respiratory muscles were unequal to the task of clearing the bronchi, and unless help were rendered immediately the patient stood a poor chance. In the case of children the first impulse would be to carry out inversion; this could not be recommended in the adult. But whenever it was possible to move the patient at all, he insisted upon the importance of the prone posture with strong inclination of the shoulders downwards, as the best substitute for inversion. By this method nearly the entire bronchial tree was placed in a position for spontaneous drainage, and the application of artificial respiration could then effect much more quickly a clearance of the bronchi and a relief of the asphyxia. He hoped the paper might lead to the formulation of recommendations for the timely adoption of adequate measures of rescue in this urgent condition.

Dr. WEST, in reply, said that if Dr. Ewart would read the abstract which had been furnished to Fellows he would see that the conditions he mentioned were such as were either liable to be confused with acute suffocative catarrh or presented interesting relations with it, and of course from this it was evident that they were not the diseases he was speaking of. He had been anxious to hear personal experiences about such cases. The particular case which he based his paper upon impressed him so much that he asked several of his colleagues at the hospital to see it with him, hoping that they might be able to explain difficulties which at the time he could not himself understand, but they seemed as puzzled as he was. It stood alone in his experience. It exactly tallied with Laennec's description. He had read many of the articles on suffocative catarrh and had written on the subject, but he had been obliged to revise his views on the subject a good deal recently. He thought that if a distinction was drawn which had not been drawn in the many papers on the matter between acute suffocative catarrh and the other conditions which were also called suffocative catarrh, an interesting series of cases might be forthcoming which would show with what degree of frequency that interesting condition occurred. He thought it was very rare, and it was very difficult to diagnose at the time. He wished to emphasise its possible relation to some acute bacterial infection, and in that connection the cases related by Dr. Wethered were very apropos, where men working in a cesspool suddenly had acute dyspnœa, though only the general result was given. In answer to Dr. Ewart, the cases he described were those in which there was no discharge in the tubes at the time, though there might be afterwards. The treatment of that dyspnœa largely depended upon the diagnosis as to its cause; he did not dwell on that because he did not know any form of treatment which was applicable generally. In answer to Dr. Wethered as to what the dyspnœa arising after operation could be, he suggested it might be due to fatty embolism, which sometimes caused very intense dyspnœa, though it was not often fatal.

A Case of Fatal Acute Ulcerative Colitis, with some Unusual Symptoms.

By Sidney Phillips, M.D.

J. S., AGED 39, a house-painter, was admitted into St. Mary's Hospital on December 2, 1907. He had been in his usual health till November 26, when he had been seized with sudden pain in the abdomen while at work, and was subsequently sick once; the pain continued, but he did not give up work till November 28, when he saw a doctor, who said he had lead colic and gave him medicine; up to that time his bowels had been constipated, but diarrhœa then came on

His wife subsequently informed us that on November 27 there was profuse melæna. He said he had had two previous attacks of a similar nature to the present one (they were thought to be lead colic): the last had been five years back. He had rheumatism in 1899, but otherwise always had good health.

On admission he was a stout, but rather pasty, strongly built man; he complained of pain in the lower part of the abdomen, and there was cutaneous hyperæsthesia over the whole abdominal wall; little, if any, distension, and the only local tenderness—and that was not great—was over the region of the descending colon. The tongue was clean, there was a blue lead line on the gums, the breath was offensive, pulse 120 per minute, temperature 99·6° F., there was some difficulty in micturition: urine, specific gravity 1024, free from albumin. The man did not appear at all ill, and only complained of dull pain in the abdomen.

On the following day (December 3) the pain had gone, but he had severe diarrhœa, seven liquid motions in the twenty-four hours with a little liquid blood in the first motion; he had hiccough two or three times, and there was leucocytosis: 12,000 white corpuscles per centimetre. During the day his heart sounds and pulse became very feeble, and the temperature rose to 100° F. He even then did not appear very ill: the diarrhœa was controlled by an enema of starch and ♏x. of laudanum, and he was given alcohol; strychnine was hypodermically injected.

The next morning (December 4) the diarrhœa returned profusely, and his pulse was getting much feebler; he had passed no urine since the evening of December 3, and a catheter found the bladder empty;

he complained of much thirst and chilliness, with very cold extremities and clammy sweats. He took liquid food well, and there was no abdominal distension (he was a stout man, and a small amount of tympanitis would not have been noticeable); stimulants and strychnine were freely made use of, but towards the evening his pulse became much feebler; the suppression of urine continued, but there was no headache, or vomiting, or drowsiness, and he was quite clear in mind, weakness being his only complaint. He died in the early hours of the morning of December 5, after an illness of nine days and complete anuria for thirty-four hours.

At the post-mortem examination, by Dr. Spilsbury, all the organs were found normal except the colon, the whole length of which was more or less denuded of mucous membrane, and scattered along its whole length were a few very small and shallow ulcers; they were quite recent and sharp edged, irregular in shape, none larger than a threepenny piece, and most of them smaller. The most severe inflammation was about the cæcum and ascending colon, but everywhere the ulceration was the minor part, and the diffuse denudation of mucous membrane the predominating lesion; it looked as if the mucous membrane had been lightly scraped off. There was some thickening of the outer coats of the colon in nearly its whole length, but no distortion or contraction of any part of it; this thickening seemed to have originated in previous inflammatory attacks, but there were no indications of previous ulceration. There were some old adhesions between the ascending colon and abdominal wall, but they were not extensive or tense, and could not have interfered with the movements of the colon; the appendix was sound, the kidneys were healthy, the urinary bladder was quite empty.

Remarks.—The thickening of the colon wall found post mortem pointed to past attacks of colitis; possibly these were the supposed previous attacks of lead colic. But the extensive denudation of the mucous membrane of the colon with the slight superficial ulcerations were evidently of quite recent origin, and probably were only set up during the few days of his fatal illness. An opportunity was thus afforded of seeing acute ulcerative colitis in an earlier stage than is usually possible. A somewhat similar condition of the colon is described by Wilks and Moxon in a case in which "the whole inner surface of the colon presented a bright vascular soft red surface with but a few minute points of ulceration." The symptoms in the present case were in the main those usually met in acute ulcerative colitis; profuse melæna at the onset is not uncommon, but it is, I think, unusual to have constipation as occurred during the first two days of this case; the hiccough and the leucocytosis were useful points in the diagnosis, being, as I pointed out in a paper on acute colitis, published in the *British Medical Journal*, June, 1907, such constant features of the disease as to be almost characteristic. The unusual features of the illness in this case, which I think render it worthy of record, were the early cardiac failure and complete suppression of urine which produced so rapidly a fatal issue. It appeared to me from the symptoms that the cardiac failure preceded the arrested secretion of urine. The kidneys and heart, as already noted, were found normal post mortem, and I can only suppose that the cardiac and renal failure was the result of some severe toxæmia, but whether the toxins were absorbed from the alimentary canal or whether they were the toxins which set up the colitis can only be a matter of doubt. So, too, was the cause of the attack of colitis; the patient stated he had not in any way deviated from his ordinary manner of life before he was taken ill; he had the blue line on the gums of lead workers, as was the case in another case of colitis recorded by me, but it seems very improbable that lead had anything to do with the disease. As to treatment, it was directed to controlling the diarrhœa by enemata and to free stimulation when signs of collapse came on. Operative measures such as opening the colon were not entertained; I did not recognise the case as one of colitis till he had been in hospital twenty-four hours (the melæna that had occurred being unknown to me), and by that time his general condition precluded any thought of operation, nor do I think it could have been of any benefit.

DISCUSSION.

Dr. HERRINGHAM said he thought all such cases of ulceration of the intestine were very interesting, but that in the future it would probably be found that they were dependent upon quite different causes. The typhoid ulcer, the tubercular ulcer, and the dysenteric ulcer, due to various causes, had already been isolated; but ulcerative colitis, which was regarded as a separate disease, had not yet been assigned a specific cause. He thought it had a cause different from any other form of ulceration. He would not wonder if a similar case to Dr. Phillips's in the future were found to have a separate bacillus as its cause. That was a matter of tremendous interest, and he thought all efforts should be directed, so far as pathology was concerned, to isolating such bacilli as could be found in cases of ulcerative colitis.

Dr. H. H. TOOTH referred to two cases of ulcerative colitis, published by him in the *Transactions of the Pathological Society*, 1894, the anatomical features of which resembled those of the present case. In Africa he saw a large number of cases of dysentery, though he was glad to say the opportunities of examining them post mortem were few. He did three post-mortems, however, and one was in a very acute stage indeed; the whole of the large intestine presented the appearance of red plush velvet, but with not much actual ulceration. In the others there was most extreme ulceration. In Africa it was called dysentery; here, ulcerative colitis. A common organism had not yet been discovered, but on the post-mortem table he could see no difference. Dr. Mott had contributed a most valuable report on what he called dysentery in asylums, but which till then had been called ulcerative colitis, and his figures again resembled exactly the appearances which he, Dr. Tooth, had become familiar with in Africa. He thought Dr. Mott was quite right in insisting on the term "dysentery" being applied to them, because the use of such a word emphasised the epidemic and infectious nature of the disease.

Dr. H. P. HAWKINS thought that all the evidence available at present in connection with the subject tended in the direction mentioned by Dr. Tooth. The cases were not to be distinguished from bacillary tropical dysentery, which there was every reason to believe was endemic in this country up to the middle of the last century. In one case which he had had under care the blood had agglutinated Shiga's bacillus perfectly, and the same thing had been noted in other cases. That bacillus had also been recovered from the bowel of such patients. At present he had under care a woman who had attacks of colitis, off and on, for sixteen years, so that her life had been rendered miserable. A few months before her admission into hospital this year actual ulceration took place. He was treating her with an anti-dysenteric serum, and so far she had improved more than one could have expected. He had also recently had a case similar to that described by Dr. Phillips. It was that of a sergeant in the Army, who had charge of an orphanage. Up to Christmas time he was in good health, and there was no trace of other similar illness in the institution. But he then began to have diarrhœa, so slight that he did not mention it or see a doctor. But after a fortnight he was too ill to do his work, and was admitted into hospital in the fourth week of his illness, when extreme anæmia was the chief feature. There was nothing special about his stools to attract attention, but his liver was enlarged. There was no fever present, nor any history of it. He did not live more than two or three days after admission. There was found to be acute inflammation and early ulceration from end to end of the colon. There were two large abscesses of the liver and numbers of smaller ones. But it was not a typical tropical abscess, because it had arisen through an infection of the portal vein, and infective pylephlebitis was present. A very careful cultural investigation was made, but nothing but the colon bacillus was discovered. He thought that this so-called ulcerative colitis was a most important question for consideration because it appeared to be increasing in frequency. He believed that the sooner the patient's colon was opened the better, and he would not hesitate to recommend that whenever he felt sure that ulceration had occurred. When ulceration had occurred he had never seen a case of recovery, but he had seen life greatly prolonged by colotomy. In one case under his care with an acute onset, the patient, a young man, almost died of hæmorrhage from the colon. Colotomy was performed, and the artificial anus had been kept open, and he had been able to finish his career at a University. Now, after the lapse of four or five years, evidence was still present to lead to the recommendation that no attempt should be made to close the opening in the cæcum. He thought that, if ulceration went to a certain depth and had a certain area, healing was impossible. As regards cases of recovery and cases of unusually long duration (as in the case before mentioned) he thought that the explanation lay in the fact that the disease was then a bacillary colitis, a superficial inflammation, and that actual ulceration had not occurred. In many fatal cases a history of previous colitis could be obtained.

Dr. DALTON said he agreed with those who thought that ulcerative colitis and dysentery were the same. He believed that variations in the symptoms were due to differences in the virulence of the organisms rather than to differences in the breed. The resisting power of the patient might also vary. He did not think the agglutination test could be considered specific. He had a case which he watched for some time, thinking it was ulcerative colitis, and it agglutinated Shiga's bacillus, but it turned out to be a case of multiple papilloma of the intestine. The symptoms were very similar.

Dr. F. PARKES WEBER asked the author whether records of cases of so-called ulcerative colitis in England showed that in most of the cases there was no obvious disease preceding the onset of the condition. In other words, did such cases occur in otherwise healthy people, or was there some preceding constitutional disorder or local disease, for instance in the kidneys or in the colon itself? In the case of a boy, aged 13, whom he had seen shortly before death, there was hypertrophic dilatation of the colon. It was a typical case of Hirschsprung's disease (megalocolon congenitum), and it seemed as if the condition of the bowel had acted as a predisposing cause of the fatal ulcerative colitis.[1]

Dr. A. M. ELLIOT said the symptoms narrated in the paper seemed to him the same as those seen in cases in the East, where no distinction was made between dysentery and colitis, and if the present case had occurred in the East it would have been called dysentery. In the hundreds of post-mortems he had done on coolies he had come across many cases similar to those described by Dr. Tooth. But there was another cause there, a disease which had recently made itself felt very materially in some parts of India, namely, kala azar, and some of the symptoms of that agreed closely with those narrated by Dr. Phillips. On opening such a case, the colon was found to be the seat of minute ulcers in some cases and in others œdema with large ulcers. In some of these ulcers Leishman-Donovan bodies had been found.

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[1] The case was published in full, with an account of the post-mortem examination, by Dr. A. Mülberger (then house surgeon at the German Hospital) in the *Zeitschr. f. klin. Med.*, Berl., 1905, lvii., p. 374.

Dr. SAMUEL WEST said he was glad to hear so clear a statement on the relation of colitis to dysentery. He had never been able to distinguish between colitis and what used to be called, in his student days, English dysentery. Ulcerative colitis had always been a mystery to him. He had been glad to hear the statement made, because it wanted making at the present day, for the subject had been confused.

The PRESIDENT said he feared his experience would be deemed rather old fashioned. At the present time a young lady, aged about 20, was making a slow recovery from an attack of what was called ulcerative colitis which began last September. At one time she had much hæmorrhage from the bowel, so that her life was in jeopardy. She had several doses of ipecacuanha, from which emetine had been extracted, given her by her attendant. He tried the drug on himself first, and found that it did not make him vomit, and so considered it safe for his patient, as if she had vomited it would probably have caused her death. That was followed by the immediate cessation of her very serious hæmorrhage.

Mr. CHARTERS SYMONDS said that, within the last two weeks, he had lost two patients with fairly acute ulcerative colitis. He had performed appendicostomy in both, washing the bowel through the appendix, but, though various reagents were tried, and in one case frequently, there was not the slightest benefit from the treatment. One patient was a married woman, aged 27, who for five years had had frequent action of the bowels, passing at times a little blood and always much mucus. Three years after marriage she became pregnant and, last August, bore a healthy child. While carrying the child she was in better health than at any other time during the three years. In November she was seized with a pain in the abdomen and diarrhœa; she went to bed and from that bed she never rose. He was asked to see her early in December for ulceration of the rectum, for which she had been under treatment. He found her much emaciated, with a hectic temperature, oscillating between 98° F. and 102° F. on most days. The sphincters were both destroyed by ulceration and the margins were protruding; there was also ulceration of one labium of the mucous membrane. She was passing very loose, green, foul motions, and was evidently in a very low condition. That continued until her death a fortnight ago. He hesitated to open the colon as she was too ill. The other case died in Guy's Hospital last week. It was that of a man who came up two years ago with some discharge of blood, mucus and slime from the rectum. The rectum felt smoother than usual, was slightly granular, as if the folds had shrunk away. Six weeks ago he returned, much reduced in health, still passing slime and blood, but there was no ulceration of the rectum and it did not bleed more easily than usual. He frequently passed green material, and rapidly went downhill and died, frequent washing out having had no result. There had been no temperature. There was found to be ulceration from the cæcum to the sigmoid, the rectum being free, and there was ulceration in the lower end of the ileum. Ten years ago one of his domestic servants was seized with acute illness, her temperature being 104° F.; he thought she had typhoid fever. He had her brought to Guy's Hospital, where she lived for some weeks, with a high temperature, profuse diarrhœa and hæmorrhage. Post mortem, there were the appearances of ordinary acute ulcerative colitis. From the remarks of Dr. Hawkins and Dr. Phillips he thought it possible he might have relieved the man if he had opened the cæcum. Would it have been possible to have diagnosed the man's case one and a half years ago when he was passing only slime and blood? And would it have been right to perform an early colotomy in the case of the lady? The only three cases which had come under his care had been fatal, yet dysentery was sometimes recovered from, even if there was considerable ulceration. But he would like to hear whether any case of that form of ulceration of the colon which he had described had been known to recover.

Dr. PHILLIPS, in reply, said it was a large question whether acute ulcerative colitis was dysentery; but nobody could object to the term acute colitis or acute ulcerative colitis, because there was inflammation of the colon and there were ulcers in it. Dysentery was used fifty years ago in a sense different from that employed now. Etymologically, it meant nothing more than pains in the intestines. Some people thought it was due to a specific organism. What dysentery was it to which ulcerative colitis was allied? It was not that associated with Shiga's bacillus, because competent pathologists had examined his cases, including the present one, and had not found it. A suggestion came from America as to one of his cases that it was a Shiga's bacillus inflammation, but it was not. If it was dysentery, that disease was now commoner in England than it was twenty or even ten years ago. He did not regard it as the same as dysentery. In the dysentery from abroad there was tenesmus and the stools were characteristic, and he did not think those cases began with the profuse melæna that the present condition did. In some of the cases he had seen the intestines were honeycombed with holes into which the finger could be placed, but there was no peritonitis round them. There was an extravasation of dry fæces days before the patient died. He thought there was more to learn about these cases instead of merely putting them down as cases of dysentery. It was certainly acute colitis, and there was a very similar disease in animals, namely, swine fever; he did not know whether it was allied to that. He did not think it was always fatal. A distinguished member of the profession had a most severe attack, lasting for weeks; he was very much emaciated and passed blood *per rectum;* that was sixteen years ago and he had never had any recurrence; he did not think dysentery would have left a man like that. There were all degrees of severity, and no case should be despaired of. Ulceration of the colon which had extended for a series of years was not colitis of the acute variety. Dr. Hawkins's example did not convince Dr. Phillips that operation was best, because the patient had still an opening in his colon, and if it had been possible to cure the patient without opening the colon he would have preferred it. Last year he was called to a case, with Dr. Wigan, of acute colitis in a woman. The colon was opened by Mr. Pepper, the hæmorrhage was stopped, and he thought that procedure saved the patient's life, but it did not stop the colitis, although eventually that got well. The cases he had seen get well recovered with small doses of intestinal antiseptics, calomel and opium apparently being the most successful. Since writing the paper he had had a case of acute colitis passing a quantity of blood. There was great pain in the abdomen, leucocytosis, and pains in the joints, but without anything objective. He was given calomel and opium, and was gradually getting well. The albuminuria which he had was gradually passing off.

Medical Section.

March 24, 1908.

Dr. SAMUEL GEE, President of the Section, in the Chair.

Observations upon Phagocytosis carried out by means of Melanin, more especially with reference to the part taken by the Leucocytes in Infectious Diseases.[1]

By S. G. SHATTOCK and LEONARD S. DUDGEON.

THE work we propose to record was taken up in the belief that interesting information might be obtained by the substitution of a finely divided inert substance in place of bacteria, wherewith to study the phagocytic index in particular infective diseases.

The questions which we set ourselves to test by this method we may put *seriatim;* and we may, after each, recount the particular observations bearing upon it and give the conclusions to be drawn from them. The substance which we selected was melanin, obtained from the eye of the ox.

I.—Will an increased phagocytosis of melanin take place if melanin is added to the *blood* of a patient suffering from an *infective disease*, as compared with *normal blood;* or if melanin is presented to normal leucocytes in an immune serum, as compared with a normal serum?

II.—Will *saturation* of an *immune serum* with melanin remove the "opsonin" and reduce the phagocytosis of normal cells against either a suspension of melanin or against the micro-organism causing a disease, or against both? That is to say, How far are "opsonization" and "de-opsonization" strictly specific?

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[1] This communication is based upon one made by the authors to the Royal Society of London, through Professor J. Rose Bradford, M.D., F.R.S., January, 1908.

III.—Will *heating* an *immune serum* reduce the phagocytosis towards a suspension of melanin (as it does towards a suspension of the bacterium causing a disease)?

IV.—Will an increased phagocytosis of melanin take place if melanin is presented to the *washed leucocytes* from an *immune blood,* in *normal serum,* as compared with *normal leucocytes* in *normal serum?*

V.—Will the phagocytosis be the same if melanin is presented to the *washed cells* of the *patient,* and to *washed normal cells,* in *immune serum?*

VI.—Is opsonin produced *in vitro* by the patient's cells in the patient's serum?

The use of melanin we adopted after a trial with many other materials. These we may merely mention, as they were not found adapted for the purpose in question, which requires that the substance should be so deeply coloured as to be readily seen in the leucocytes, and sufficiently fine and uniform to allow of accurate numeration.

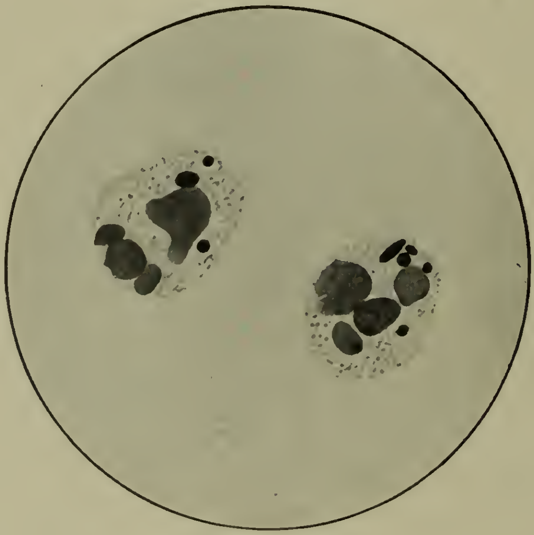

Fig. 1.

Polymorphonuclear Leucocytes, showing the ingestion of melanin granules. From a blood-film stained with carbol thionine. $\frac{1}{12}$ oil immersion. (Oc. G. Zeiss.)

Other materials tried were: the finest wood charcoal suspended in salt solution and allowed to partially settle, the upper layers of the fluid being removed with a pipette for use; "Indian ink," as supplied in water-colour; carmine ground in salt solution and filtered; vermilion; Prussian blue.

The melanin first used was obtained from the freshly removed melanotic tumours which are common in grey horses. In the later experiments we used that from the eye of the ox. It is more readily obtained and prepared from the latter source, and is a perfect material for the purpose; the granules are spherical, and although they vary in size they are mostly so fine that they readily pass through filter paper and admit of numeration in the leucocytes even more easily than the best stained micrococci.

TECHNIQUE.

(a) The Melanin Suspension.—Half a dozen perfectly fresh ox eyes are cut through in a coronal direction; the vitreous, lens and retina are completely removed, and the iris and choroid detached and soaked in tap water to extract the blood, the object being to reduce the amount of proteid to a minimum. The material is then cut up with scissors in a mortar, and gently rubbed with a small quantity of cold citrated salt solution (0·9 per cent. salt + 1 per cent. citrate of sodium). More of the solution is added and the whole filtered into a flask. The fluid is now well boiled and filtered at once into a second flask, the mouth of which is then plugged with a sterilized rubber cork. After three or four days the melanin will have sedimented. The supernatant fluid is removed with a sterilised pipette and the flask again filled with boiling solution and shaken. After sedimentation of the melanin the fluid is a second time decanted, the substance having by this means been thoroughly washed. A small amount of boiling solution is again filtered into the flask, the whole shaken and filtered into small sterilized conical flasks, corked with rubber, and stored in a dark place beneath a shade. It is advisable to filter a small quantity of the material into a watch glass for immediate use; by this means any clumps are removed; the fluid, moreover, in the watch glass should be briskly stirred with a fine glass rod before and whilst being drawn up the capillary tube during an experiment. After a flask has been opened the contents should be heated for a short while in a water-bath to preserve them in a sterile condition.

(b) Blood-Cells.—The blood is received into citrated salt solution and centrifuged, the fluid is decanted, and the cells gently shaken with salt solution and centrifuged, this being carried out thrice in succession. Portions of the surface layer of the cells are then (after decanting the supernatant fluid) drawn up the capillary tube in which the mixture is to be made.

(c) The Blood-Serum.—This is obtained from blood drawn into short pipettes and allowed to clot, the clear serum being drawn up the capillary tube from the wider broken end of the pipette in making the mixture. In preparing the mixture within the capillary tube we use: 1 part of the washed blood-cells, 1 part of serum, and 1 part of melanin suspension, and in this order. The three materials are then forced out by compressing the rubber teat fixed to the wider end of the pipette, mixed in a watch glass in the usual way, and finally drawn up the capillary tube, the fine end of which is sealed in the flame. The tube is incubated at 37° C. in the horizontal position for twenty minutes. Its contents are then forced out and a film spread over a slide. The film, after being rapidly dried in the air, is washed in tap water in order to remove the hæmoglobin from the red cells and so render them invisible; it is then stained either with hæmalum or with carbol thionine for one minute, and finally washed in tap water and dried. Carbol thionine we prefer to hæmalum. The advantage gained by washing the films (unfixed by heat or reagents) before staining is considerable. In place of the film being crowded with visible red cells, the only structures that strike the eye are the various leucocytes and the melanin granules within and outside them; the numeration of the granules is, in consequence, facilitated, as is likewise the determination whether the granules have become engaged in the leucocytes. It may be mentioned, in passing, that the same advantage is to be gained by the adoption of this device in the numeration of bacteria in ordinary opsonic observations. The method of removing the hæmoglobin from the red cells was devised by Ronald Ross for the easier detection of malarial parasites in blood-films, and by one of us independently for the study of the melanin blood-films, by using only aqueous solutions of the dyes selected for staining the dried and unfixed film. When a direct examination of the blood is required, although at first we used 1 volume of blood, 1 volume of citrated salt solution, and 1 volume of salt suspension of melanin, we later on took only 1 volume of blood and 1 volume of citrated salt suspension of melanin. The method of using only 2 volumes is, indeed, the simplest that can be devised. By employing *citrated* salt suspension of melanin the blood is prevented from coagulating at the same time that the material to be ingested is presented to it. We may add that the numeration was carried out exclusively by one of us (D.) in order to avoid error arising from personal equation.

QUESTION I

Will an increased phagocytosis of melanin take place if melanin is added to the *blood* of a patient suffering from an *infective disease*, as compared with *normal blood*; or if melanin is presented to normal washed leucocytes in an immune serum, as compared with normal serum?

To give first the results of the simpler of these two observations. The method consisted in drawing up 1 volume of blood into the capillary end of a pipette, and immediately after this 1 volume of citrated salt solution (1 per cent. sodium citrate, 0·9 per cent. salt), and thirdly 1 volume of melanin, suspended in salt solution. The 3 volumes were discharged from the tube by means of a rubber teat fixed to the wider end, mixed in a watch glass in the usual way, and finally drawn up the capillary portion of the pipette, the fine end of which was then sealed in the flame, and the pipette laid horizontally in the incubator at 37° C. for twenty minutes; the blood-film was thereupon prepared as already described. In our later observations we simplified this technique by using only 2 volumes, viz., 1 volume of blood and 1 volume of melanin suspended in *citrated* salt solution instead of in simple salt.

CASE.—Broncho-pneumonia; child; the temperature had just fallen by lysis; recovery took place.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 20 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 5 granules.

Index, 0·25.

CASE.—Pneumococcal empyema; male, aged 13. Staphylococcus was obtained from the blood taken from the median basilic vein. Patient recovered after a long and severe illness.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 28 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 8 granules.

Index, 0·28.

CASE.—Cellulitis.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 29 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 16 granules.

Index, 0·5.

Case.—Cerebrospinal fever; child; the patient had received an injection of meningococcal vaccine three and a half hours before the observation was made.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 33 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 17 granules.

Index, 0·5.

Case.—Acute pneumonia; rise of temperature to 103° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 42 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 25 granules.

Index, 0·59.

Case.—Subacute broncho-pneumonia; temperature, 101·8° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 40 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 29 granules.

Index, 0·7.

Case.—Suppurating hernia.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 42 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 32 granules.

Index, 0·76.

Case.—Acute pleurisy; child, aged 7; temperature, 99·2° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 22 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contsined 23 granules.

Index, 1·0.

Case.—Diffuse cellulitis of neck; patient extremely ill.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 59 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 69 granules.

Index, 1·1.

Case.—Acute cellulitis of leg.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 29 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 33 granules.

Index, 1·1.

Case.—Acute mastoid suppuration; thrombosis of lateral sinus.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 42 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin: 50 cells contained 48 granules.

Index, 1·1.

Case.—Acute pneumococcal arthritis (ankle); child, aged 10.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 29 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 36 granules.

Index, 1·2.

Case.—Pneumonia. (In the following observation, in place of the blood, as used in all the foregoing experiments, washed cells were used in the two sera.)

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 65 granules.

1 volume of patient's washed cells, 1 volume of patient's serum, 1 volume of melanin:
50 cells contained 81 granules.

Index, 1·2.

Case.—Male, aged 61; chronic abscess after old amputation; *Staphylococcus aureus* infection; high temperature.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 59 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 135 granules.

Index, 2·2.

Case.—Acute pneumonia; male, aged 59; blood taken just before the crisis.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 28 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 64 granules.

Index, 2·2.

Case.—Abscess of chest wall; temperature, 101·6° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 22 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 54 granules.

Index, 2·4.

Case.—Suppuration of prepatellar bursa, due to pneumococcus; female.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 20 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 51 granules.

Index, 2·5.

Case.—Cellulitis of foot and leg; temperature, 102·6° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 22 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 60 granules.

Index, 2·7.

Case.—Acute broncho-pneumonia; child, aged 2; temperature, 102·8° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 40 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 116 granules.

Index, 2·9.

Case.—Acute septic pneumonia, following pyorrhœa alveolaris; male.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 33 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 106 granules.

Index, 3·1.

Case.—Acute pneumonia; patient a male, delirious; death occurred a few hours after the blood was taken.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 90 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 304 granules.

Index, 3·3.

Case.—Carbuncle; diabetes; pyrexia.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 10 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 34 granules.

Index, 3·4.

Case.—Gangrenous appendicitis; boy, aged 15. (Operation was performed after the blood was drawn.)

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 37 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 99 granules.

Index, 3·6.

Case.—Acute arthritis; measles; suppurative impetigo; temperature, 102·2° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 12 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 45 granules.

Index, 3·7.

Case.—Acute lobar pneumonia with pleural effusion; illness of forty-eight hours; temperature, 103·8° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 30 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 142 granules.

Index, 4·7.

Case.—Acute pneumonia; delirium tremens; temperature 102·2° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 29 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin:
50 cells contained 140 granules.

Index, 4·8.

CASE.—Acute erysipelas and cellulitis.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 10 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 56 granules.

Index, 5·6.

CASE.—Acute pneumonia ; child, aged 2 ; temperature, 105° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 12 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 82 granules.

Index, 6·8.

CASE.—Acute pneumonia ; child, aged 2. The same case as the preceding, the blood being taken just after the crisis.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 12 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 84 granules.

Index, 6·9.

CASE.—Acute pneumonia ; child, aged 2 ; temperature, 102° F.

1 volume of normal blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 12 granules.

1 volume of patient's blood, 1 volume of citrated salt solution, 1 volume of melanin :
50 cells contained 107 granules.

Index, 8·0.

Summary and Conclusions drawn from Observations made to Test the First Part of Question I.

In a total of 32 cases, the phagocytic index is below par in 8, at par in 7, and above par in 17, ascending to 2, 3, 4, 5, 6, 7, and even 8. It might be at first assumed that the heightened index showed that the increased phagocytosis is due to the presence of a cytotropic substance exclusively, seeing that melanin, not being bacterial, cannot (so it might be supposed) be susceptible to the action of a bacteriotropic or opsonic substance. This, however, is not the case. The proof of this we will adduce later on, but briefly it consists in this, viz., that an immune serum can be largely *de*-opsonized by means of melanin if the latter is used to saturation. And if melanin can deopsonize, it can only do so by becoming opsonized. We believe that in both cases the result so obtained is mechanical, the finely divided substance, though inert, entangling or becoming invested with the still more finely particulate material of which the opsonin would thus appear to consist.

In the six following observations the ordinary method of estimating the opsonic index was carried out, *i.e.*, normal washed leucocytes were used (1) in normal serum, (2) in the patient's serum.

CASE.—Acute pneumonia.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin.
1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin.
Index, 0·47.

CASE.—Lymphangitis of arm (*Staphylococcus aureus*).

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin: 50 cells contained 84 granules.
1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin: 50 cells contained 62 granules.
Index, 0·7.

CASE.—Pneumonia.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin: 50 cells contained 65 granules.
1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin: 50 cells contained 71 granules.
Index, 1·0.

The index of the same case, substituting the patient's washed cells for the normal washed cells in the second of the two above observations, was 1·2.

CASE.—Acute lobar pneumonia, with pleural effusion; ill forty-eight hours; temperature, 103·8° F.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin: 50 cells contained 92 granules.
1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin: 50 cells contained 101 granules.
Index, 1·0.

The index of the same case, using simply normal blood, citrated salt solutions, and melanin, against the patient's blood, citrated salt solution, and melanin, was 4·7.

CASE.—Urinary fever (*Bacillus coli*).

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin.
1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin.
Index, 1·2.

CASE.—Empyema.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin.
1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin.
Index, 1·3.

Remarks on the Six Foregoing Observations.

The index in the third and fourth cases was taken by Wright's method, and also by the simpler one of using normal blood against the blood of the patient. The index obtained by the second method is in both cases higher, being 1·2 as compared with 1·0 and 4·7 as compared with 1·0.

QUESTION II.

Will *saturation of an immune serum* with *melanin* remove the "opsonin" and *reduce* the *phagocytosis* of normal cells against either the bacterium or a suspension of melanin, or against both? That is to say, how far are "opsonization" and "de-opsonization" strictly specific?

In the first of the following observations the action of the patient's cells in the presence of melanin is compared, in the patient's serum, and in the patient's serum after saturation with melanin. The serum was digested with a thick suspension of melanin for two hours and a half at 37° C.

CASE.—Acute appendicitis; peritonitis, due to *Bacillus coli.*

1 volume of the patient's washed cells, 1 volume of the patient's serum, 1 volume of melanin: 50 cells contained 68 granules.

1 volume of the patient's washed cells, 1 volume of the patient's serum after saturation with melanin, 1 volume of melanin: 50 cells contained 28 granules.

The phagocytosis was reduced to nearly one-third.

CASE.—Pulmonary tuberculosis, untreated with tuberculin.

(A) 1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of tubercle bacilli (in 1·5 per cent. salt solution): 50 cells contained 155 bacilli.

Serum of patient saturated with thick suspension of tubercle bacilli, digested for four hours and a quarter at 37° C. and centrifuged.

(i.) 1 volume of the clear fluid thus obtained, 1 volume of normal washed cells, 1 volume of tubercle bacilli: 50 cells contained 46 bacilli.

(ii.) 1 volume of the clear fluid thus obtained, 1 volume of normal washed cells, 1 volume of melanin: 50 cells contained 2 granules.

(B) 1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin: 50 cells contained 22 granules.

Serum of patient saturated with thick suspension of melanin, digested for four hours and a quarter at 37° C. and centrifuged.

(i.) 1 volume of the clear fluid thus obtained, 1 volume of normal washed cells, 1 volume of melanin: 50 cells contained 5 granules.

(ii.) 1 volume of the clear fluid thus obtained, 1 volume of normal washed cells, 1 volume of tubercle bacilli: 50 cells contained 113 bacilli.

CASE.—Pulmonary tuberculosis, untreated with tuberculin.

(A) 1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of tubercle bacilli: 50 cells contained 170 bacilli.

Serum of patient saturated with an equal portion of a very thick suspension of tubercle bacilli in 1·5 per cent. salt solution, digested for two hours and a quarter at 37° C. and centrifuged.

(i.) 1 volume of the clear fluid so obtained, 1 volume of normal washed cells, 1 volume of tubercle bacilli: 50 cells contained 13 bacilli.

(ii.) 1 volume of the clear fluid thus obtained, 1 volume of normal washed cells, 1 volume of melanin 50 cells contained 5 granules.

(B) 1 volume of normal washed cells, 1 volume of patient's serum, 1 volume of melanin: 50 cells contained 18 granules.

Serum of patient saturated with a very thick suspension of melanin, digested at 37° C. for two hours and a quarter and centrifuged.

(i.) 1 volume of the clear fluid so obtained, 1 volume of normal washed cells, 1 volume of melanin: 50 cells contained 6 granules.

(ii.) 1 volume of the clear fluid so obtained, 1 volume of normal washed cells, 1 volume of tubercle bacilli: 50 cells contained 56 bacilli.

Summary and Conclusions from the Foregoing Group of Observations.

In observation 1, the saturation with melanin, of the immune serum from a case of acute peritonitis, reduced the phagocytosis (using normal cells) from 68 granules of melanin to 28 granules. This result shows that a large amount of opsonin has been removed by the melanin, the phagocytosis being reduced to one-third.

In observation 2, pulmonary tuberculosis, untreated with tuberculin; when the serum was saturated with melanin, the phagocytosis (using normal cells) was reduced from 22 granules of melanin to 5 granules, showing that a large amount of *de*-opsonization towards melanin had been brought about; the opsonin was reduced to one-fourth. Towards tubercle bacilli the phagocytosis (using normal cells) in the patient's serum was 155 bacilli in 50 cells. After saturation with tubercle bacilli the phagocytosis was reduced to 46 bacilli. How far did the saturation with tubercle bacilli reduce the phagocytosis of melanin? The phagocytosis of melanin was reduced from 22 granules to 2 after saturation of the serum with *tubercle bacilli; i.e.*, the opsonin was reduced to one-eleventh. How far did the saturation with melanin reduce the phagocytosis towards tubercle bacilli? The reduction here is from 155 to 113. This is considerably less than will appear from the following observation.

In observation 3, the serum used was from a case of pulmonary tuberculosis, untreated with tuberculin. When the serum was saturated with melanin, the phagocytosis (using normal cells) was reduced from 18 granules of melanin to 6 granules, showing that a large amount of *de*-opsonization towards melanir had been brought about. As in the preceding observation, the opsonin was reduced to one-third. Towards tubercle bacilli the phagocytosis (using normal cells) in the patient's serum was 170 bacilli in 50 cells. How far did the saturation with tubercle bacilli reduce the phagocytosis of melanin? The phagocytosis of melanin was reduced from 18 granules to 5 granules after saturation of the serum with *tubercle bacilli*. As it was reduced after saturation with *melanin* from 18 to 6, the reduction is the same, *i.e.*, the tuberculous serum is de-opsonized towards melanin, equally by saturation with tubercle bacilli and with melanin. How far did the saturation with melanin reduce the phagocytosis towards tubercle bacilli? The reduction here is from 170 to 56. It will be noticed that the proportion here is very nearly the same as the reduction in phagocytosis towards melanin after saturation with melanin; the phagocytosis is reduced to one-third. Although the fall is only from 170 to 56 as compared with that from 170 to 13 (after saturation with tubercle bacilli), it is clear, nevertheless, that a large amount of the "tubercular opsonin" has been removed by the melanin; and to this extent the opsonin is not specific to the tubercle bacillus.

R. Muir and W. B. M. Martin[1] conclude that there is present in an immune serum a specific or immune (thermostable) opsonin, and in addition a normal (thermolabile) opsonin. The markedly increased phagocytosis of melanin in immune blood would, on such a view, imply that this was due solely to the increase of "normal" opsonin. In the *de*-opsonization of an immune serum by melanin the opsonin removed would be, on the same supposition, "normal" or "common," however much increased in amount. The authors cited show, indeed, that the thermolabile, "common," or non-specific opsonin may be removed from the same normal serum by various different micro-organisms; but that in a heated immune serum the specific bacterium will alone remove the persisting thermostable opsonin. As the opsonin chiefly increased in amount in immune serum is thermolabile, it would be thus assumed to be non-specific.

As already observed, the fact that an immune serum can be *de*-opsonized by means of melanin shows that melanin can itself be opsonized. The opsonization and de-opsonization are probably in this case only mechanical, the finely divided melanin, though inert, entangling or becoming invested with the still more finely particulate material of which the opsonin would thus appear to consist.

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[1] *Proc. Roy. Soc.*, Lond., 1907, Ser. B., lxxix., p. 187.

Question III.

Will *heating an immune serum reduce* the *phagocytosis* towards a suspension of *melanin* in the same way that it is known to do towards a suspension of the bacterium causing a disease? The serum in the four following observations was heated at 60° C. for ten minutes.

Case.—Erysipelas.

1 volume of normal washed cells, 1 volume of patient's unheated serum, 1 volume of melanin: 50 cells contained 130 granules.

1 volume of normal washed cells, 1 volume of patient's heated serum, 1 volume of melanin: 50 cells contained 88 granules.

Index, 0·67.

Case.—Acute pleuritis; temperature 100° F.

1 volume of normal washed cells, 1 volume of patient's unheated serum, 1 volume of melanin: 50 cells contained 126 granules.

1 volume of normal washed cells, 1 volume of patient's heated serum, 1 volume of melanin: 50 cells contained 30 granules.

Index, 0·23.

Case.—Streptococcus pyæmia.

1 volume of normal washed cells, 1 volume of patient's unheated serum, 1 volume of melanin: 50 cells contained 217 granules.

1 volume of normal washed cells, 1 volume of patient's heated serum, 1 volume of melanin: 50 cells contained 35 granules.

Index, 0·16.

Case.—Erysipelas.

1 volume of normal washed cells, 1 volume of patient's unheated serum, 1 volume of melanin: 50 cells contained 165 granules.

1 volume of normal washed cells, 1 volume of patient's heated serum, 1 volume of melanin: 50 cells contained 28 granules.

Index, 0·16.

Summary and Conclusions from the Observations made to Test the Preceding Question.

The observations show clearly that the phagocytosis of *normal* cells is greatly reduced towards melanin in immune serum that has been heated, as it is towards bacteria. This is a corollary of the observations recorded under Question I., which show that in immune serum the phagocytosis of melanin may be largely increased, *i.e.*, that melanin is capable of being opsonized. So when opsonin is removed by heating the immune serum the phagocytosis of normal cells is notably reduced. The indices, commencing with that showing the least reduction, run: 0·67, 0·23, 0·16, 0·16.

QUESTION IV.

Will an increased phagocytosis of melanin take place if melanin is presented to the *washed leucocytes* of an *immune blood* in *normal serum*, as compared with *normal washed leucocytes* in *normal serum* ?

CASE.—Acute erysipelas ; child, aged 7.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 81 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 38 granules.

Index, 0·46.

CASE.—Chronic bone abscess due to *Staphylococcus aureus*.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 81 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 61 granules.

Index, 0·7.

CASE.—Acute pneumonia, with pleural effusion ; ill forty-eight hours ; temperature, 103·8° F.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 92 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 96 granules.

Index, 1·0.

CASE.—Pneumonia.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 65 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 71 granules.

Index, 1·0.

CASE.—Lymphangitis of arm.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 84 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 92 granules.

Index, 1·0.

CASE.—*Streptococcus pyogenes* pyæmia.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 81 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin :
50 cells contained 81 granules.

Index, 1·1.

Case.—Acute cellulitis of leg.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 74 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 110 granules.

Index, 1·4.

Case.—Diffuse cellulitis of leg, due to *Streptococcus pyogenes.*

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 81 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 129 granules.

Index, 1·5.

Case.—Acute pneumonia.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin.

Index, 1·6.

Case.—Acute peritonitis, treated with anti-coli serum.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 81 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 146 granules.

Index, 1·8.

Case.—Acute general peritonitis.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 26 granules.

1 volume of patient's washed cells, 1 volume of normal serum, 1 volume of melanin:
50 cells contained 77 granules.

Index, 2·9.

Summary and Conclusions from the Observations made to Test the Foregoing Question.

In the case where melanin is presented to normal washed cells and to the patient's washed cells, both in *normal serum*, the phagocytosis is, in some, below par; in others, above; in others at par. The indices run: 0·46, 0·7, 1·0, 1·0, 1·0, 1·1, 1·4, 1·5, 1·6, 1·8, 2·9.

Question V.

Will the phagocytosis be the same if melanin is presented to the *washed cells* of the *patient* and to *washed normal cells*, in *immune serum*?

In the following experiment the action of normal cells and patient's cells was tested in the patient's serum.

CASE.—*Streptococcus pyogenes* pyæmia. Index, 1·7.

CASE.—Acute pneumonia; fifth day of disease; male, aged 23; temperature, 103° F. Index, 3·3.

In each of these observations the work done by the patient's cells is greater than that done by normal cells would be, the indices being 1·7, 3·3.

In the four following observations the phagocytosis of leucocytes from different cases of *Bacillus coli* infection, in the same immune serum, is set forth, as compared with that of normal cells in the same immune serum. The immune serum was from a case of bone abscess in which the colon bacillus was present. The patient had been treated with anti-serum and also with vaccine.

CASE.—*Bacillus coli* infection of the urinary tract; treated with anti-coli serum and with vaccine.

Index, 0·9.

CASE.—Bone abscess in which *Bacillus coli* was present; treated with anti-coli serum and with vaccine.

Index, 1·0.

CASE.—Acute appendicitis; treated with anti-coli serum and with vaccine.

Index, 1·2.

CASE.—Acute peritonitis; treated with anti-coli serum.

Index, 2·4.

The indices of these observations run: 0·9, 1·0, 1·2, 2·4. In the last of them the patient's cells are doing considerably more work than normal cells in the same immune serum.

In the three following observations the cells from a standard case of acute pneumonia were tested against normal cells in immune sera from cases of different diseases.

CASE.—Empyema.

1 volume of normal washed cells, 1 volume of patient's (empyema) serum, 1 volume of melanin.

1 volume of washed standard pneumonia cells, 1 volume of patient's (empyema) serum, 1 volume of melanin.

Index, 1·3.

CASE.—Urinary fever (*Bacillus coli* infection).

1 volume of normal washed cells, 1 volume of patient's (urinary fever) serum, 1 volume of melanin.

1 volume of washed standard pneumonia cells, 1 volume of patient's (urinary fever) serum, 1 volume of melanin.

Index, 1·7.

CASE.—Acute pneumonia.

1 volume of normal washed cells, 1 volume of patient's (pneumonia) serum, 1 volume of melanin.

1 volume of washed standard pneumonia cells (from another patient), 1 volume of patient's (pneumonia) serum, 1 volume of melanin.

Index, 6·5.

In all these three observations it will be seen that the washed pneumonia cells are doing more work than washed normal cells in the immune serum of three different patients, the most marked difference being that where pneumonia serum was selected. The indices run: 1·3, 1·7, 6·5.

In the following observation the action of normal cells and patient's cells from a case of acute general peritonitis was tested in the serum of another patient suffering from chronic pulmonary tuberculosis.

1 volume of normal washed cells, 1 volume of tuberculous serum, 1 volume of melanin.

1 volume of patient's washed cells (acute peritonitis), 1 volume of tuberculous serum, 1 volume of melanin.

Index, 1·4.

This observation, like the three that precede it, shows that the washed cells from a case of acute infection are more active than normal cells in the serum of a patient suffering from another disease, the index being 1·4.

In the following observations the action of normal washed cells is compared with the action of the patient's washed cells, in the presence of melanin, in the patient's serum, heated at 58° C. for fifteen minutes. Index, 0·9.

CASE.—Acute cellulitis of leg.

Index, 2·0.

In the two following observations the action of normal washed cells is compared with the action of standard pneumonia cells in the heated serum of two other patients.

CASE.—Acute pneumonia.

1 volume of normal washed cells, 1 volume of heated pneumonia serum, 1 volume of melanin.

1 volume of standard pneumonia washed cells (*i.e.*, from another case of pneumonia), 1 volume of heated pneumonia serum, 1 volume of melanin.

Index, 1·0.

Case.—Empyema.

1 volume of normal washed cells, 1 volume of heated empyema serum, 1 volume of melanin.

1 volume of standard pneumonia cells, 1 volume of heated empyema serum, 1 volume of melanin. (Serum heated at 60° C. for twenty minutes.)

Index, 1·6.

In the following observation the action of normal washed cells is compared with the action of the same standard pneumonia cells as used in the preceding observations in *normal heated serum.*

1 volume of normal washed cells, 1 volume of normal heated serum, 1 volume of melanin.

1 volume of standard pneumonia washed cells, 1 volume of normal heated serum, 1 volume of melanin.

Index, 2·0.

In the five preceding observations, in the first four of which washed normal cells were tested against washed immune cells in heated immune serum, and in the fifth in normal heated serum, the indices run: 0·9, 1·0, 1·6, 2·0, 2·0. In two the immune cells are doing more work than normal cells in the heated immune serum; and the same is true in the case of the heated normal serum.

In the following observations, *colon bacilli* were substituted for melanin, and the cells from a case of streptococcal puerperal fever, with multiple intramuscular and subcutaneous abscesses, were used in coli serum against normal cells in the same coli serum. The patient from whom the cells were taken died within forty-eight hours after the blood was taken. The blood was observed to be very watery when taken and showed agglutination of the cells.

Case.—Urinary fever (*Bacillus coli* infection).

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of colon bacilli.

1 volume of normal washed cells, 1 volume of patient's (*Bacillus coli* infection) serum, 1 volume of colon bacillus.

Index, 2·4.

This index shows that the patient's serum is markedly active, *i.e.*, it contains a good amount of an opsonin which will prepare the colon bacillus for ingestion.

In the next place, the cells from a patient suffering from puerperal fever (streptococcal) were substituted for normal cells, thus:—

1 volume of normal washed cells, 1 volume of patient's serum (colon infection), 1 volume of colon bacilli.

1 volume of washed cells of patient suffering from puerperal fever, 1 volume of patient's serum (colon infection), 1 volume of colon bacilli.

Index, 0·5.

This observation indicates that, although in colon serum, colon bacilli, when presented to normal washed cells, gave a good index (2·3), when presented in the same serum to the washed cells of another patient, suffering from puerperal fever, the index fell to 0·5. This can only mean that the cells from the puerperal patient are incapable of carrying out the same amount of ingestion as normal cells in the same colon serum against the same colon bacilli. The cells cannot make use, *i.e.*, of the phagocytic opportunity offered to them. Their decreased activity may be ascribed to damage sustained whilst in the circulating blood or to the exhaustion brought about by the forced production of antibodies under the same circumstances. It may be inferred from these data that a low opsonic index (as reached by the usual method) might be found still lower were the *patient's cells* used in the patient's serum in place of using *normal cells* in the patient's serum against normal cells in normal serum.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of colon bacilli.

1 volume of patient's washed cells (puerperal fever), 1 volume of normal serum, 1 volume of colon bacilli.

Index, 0·56.

This extension of the foregoing observation shows that the cells from the same case of puerperal fever do only half the work in normal serum, against colon bacilli, which normal cells do in the same normal serum against colon bacilli. This is the same proportion which was obtained by presenting: (1) normal cells, and (2) the same patient's cells, in the patient's serum, where the patient's cells are doing only half the work of normal cells.

In the following experiment colon bacilli were substituted for melanin; and the washed cells from the same case of puerperal fever as the preceding were tested against normal cells in the patient's serum.

Case.—Puerperal fever; *Streptococcus pyogenes;* death with pyæmia.

1 volume of normal washed cells, 1 volume of normal serum, 1 volume of colon bacilli.

1 volume of normal washed cells, 1 volume of patient's serum (puerperal fever), 1 volume of colon bacilli (not from patient).

Index, 0·8.

1 volume of normal washed cells, 1 volume of patient's serum (puerperal fever), 1 volume of colon bacilli (not from patient).

1 volume of patient's washed cells (puerperal fever), 1 volume of patient's serum, 1 volume of colon bacilli (not from patient).

Index, 0·3.

This observation shows that the patient's cells (streptococcal infection) are less active in the patient's serum against colon bacilli than are normal cells in the patient's serum against colon bacilli. The result corresponds closely with those which precede it, in which a colon serum was used in place of the above patient's serum, but with the same puerperal patient's cells.

Summary and Conclusions from the Foregoing Group of Observations Placed under Question V.

In the observations where melanin was presented to normal washed cells and to the patient's washed cells, in the patient's own serum or in the serum of another patient suffering from another infective disease, the indices run: 0·9, 1·0, 1·2, 1·3, 1·4, 1·7 ,1·7, 2·4, 3·3, 6·5. In *heated immune serum* the washed immune cells against normal washed cells give indices of 0·9, 1·0, 1·6, 2·0. In *heated normal serum* the index, in the single observation made, was 2·0.

In the majority of cases the patient's cells take up more melanin or more bacilli than do normal cells in *immune serum*, whether the immune serum be that of the patient or that of another patient suffering from another infective disease. The higher indices run: 2·4, 3·3, 6·5. When the patient's cells are compared with normal cells in *normal serum* the indices range from 0·46 to 2·9. The action of the patient's cells would thus appear to be a factor which requires consideration if a full estimate of the patient's hæmophagocytic resistance is to be arrived at. This is strikingly brought out in many of the observations made by presenting melanin directly to normal blood and to immune blood, the indices here rising above those usually obtained by Wright's method of using normal cells in normal serum against normal cells in immune serum. In a total of 32 cases, the index was above par in 17, ascending to 2, 3, 4, 5, 6, and even 8. Were the cells indifferent factors, normal cells would ingest to the same extent as the patient's cells in the patient's serum. This is not the case. The patient's cells may be less active or they may be more active. The conclusion to which the observations lead us is that the calculation of the opsonic value of the patient's serum alone (as made by Wright's method) does not give a full estimate of the patient's hæmophagocytic resistance. It may be too high or too low or, as a coincidence, it may exactly represent it. In what may this greater activity of the patient's cells consist?

On the strict "opsonic theory," the greater activity must be ascribed to an elaboration of opsonin by the patient's leucocytes in the patient's serum, which brings about a still further increased preparation of melanin in the already opsonized serum. This would mean that the patient's leucocytes, instead of playing only the secondary part of ingesting prepared bacteria, both prepare and then ingest them. To gauge the curative capacity of the patient's serum only, Wright's method is doubtlessly the correct one, for normal cells are used in the patient's serum against normal cells in normal serum.

And the question may be raised whether the action of the patient's cells *should* be considered, for if their greater activity were due only to a further formation of opsonin, in observations carried out *in vitro*, it may be urged that this exalted phagocytic index does not represent that of the circulating blood, but is too high: the patient's cells are transferred to the patient's serum in relatively abnormal numbers, and during the twenty minutes incubation they may be elaborating from the patient's serum a further amount of opsonin which overcharges the serum in the capillary tube and brings about a fictitious degree of phagocytosis.

If any substance continues to be produced in the serum, *in vitro*, it must be an opsonin. It cannot be a substance that would stimulate the cells to greater activity; we cannot suppose that the cells produce and shed into the serum a "stimulin" in order to stimulate themselves. The patient's cells produce a further amount of opsonin, or they are simply "more active" than are normal cells. One must remember that the process of thrice washing the cells in salt solution does not wash out the leucocyte; it only washes the surface of it.

One difficulty that arises in testing the alternatives just stated will be obvious: During the process of incubation *in vitro* two phenomena may be proceeding simultaneously—the cells may be simply ingesting, or they may be producing opsonin and ingesting. If the phagocytosis increases upon allowing further time, it has to be determined whether this is due to further opsonization or simply to the fact that the cells are allowed a longer time in which to work; and even the termination of further phagocytosis, with an extreme time allowance, might mean either a termination of further opsonin production, or that the cells had taken up all for which they had the capacity.

Our observations bring out that the immune or active cells, as compared with normal cells, although they usually do more work in both immune and in normal serum, do more in the immune than in the normal.

This points to some interaction between the patient's cells and the patient's serum; it indicates that there is something in the patient's serum which is in excess, or which is not present in normal serum. If we agree to call this "something" a stimulin, its presence will not, *per se*, account for the difference; for such a substance would equally stimulate the normal cells to do the same amount of work as the immune cells in the immune serum—which is not the case. In heated immune serum, again, the immune cell does more work than the normal; so that whether the substance left in the serum after heating is bacteriotropic (opsonin) or cytotropic (stimulin) it is clear that the immune cells respond differently from the normal. We are led to hold, therefore, that the immune cell, as a cell, is in many cases more active, more irritable, or more sensitive than the normal, as it may be less active than the normal cell or active to the same degree. The immune cell has acquired a heightened activity in the body in response to the increased function demanded of it to cope with the infective process: its physiological reserve has been called out. The fact that more phagocytosis occurs in immune serum with immune cells than with normal cells, arising as it does from an interaction between the two, indicates that in the living body, from a similar interaction, the patient's cells are likewise doing more work than would normal cells, if we imagined, *e.g.*, the whole of the patient's leucocytes suddenly replaced in his own plasma by normal cells.

QUESTION VI.

Is *opsonin* produced *in vitro* by the patient's cells in the patient's serum?

The only thing that would vitiate the foregoing conclusion would be evidence of an additional formation of opsonin *in vitro*, during the twenty minutes in which the capillary tube containing the immune serum, the immune cells, and the melanin or bacteria, was being incubated. It is conceivable that the immune serum contains a precursory substance—an opsinogen—which is converted into opsonin by a ferment produced by the cells, and that the increased phagocytosis of immune cells in immune serum is due to their greater secreting activity, *i.e.*, to their increased production of the converting substance; and that when melanin or bacteria are presented *in vitro* this interaction is set going, or, rather, restarted in the drawn blood.

OBSERVATION. CASE.—Empyema.

1 volume of blood, 1 volume of citrated salt suspension of melanin.

Four tubes were prepared and incubated for different periods, with the following results:

Fifteen minutes	...	9	granules	of melanin	in 50	cells
One hour ...	...	21	,,	,,	,, 50	,,
Two hours ...	...	36	,,	,,	,, 50	,,
Four hours ...	...	76	,,	,,	,, 50	,,

In such an observation it is impossible to determine whether the progression is due to further formation of opsonin or to the increased time allowed for the continuance of phagocytosis.

When bacteria are used in place of melanin this progression may be more highly pronounced, as is shown in the three following observations.

CASE.—Acute cellulitis; temperature, 102° F.

1 volume of patient's blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated twenty minutes. 50 cells contained 126 bacilli.

1 volume of patient's blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated thirty minutes. 50 cells contained 195 bacilli.

CASE.—Urinary infection due to colon bacillus; untreated with anti-serum or vaccine.

1 volume of patient's blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated twenty minutes. 50 cells contained 115 bacilli.

1 volume of patient's blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated thirty minutes. 50 cells contained 165 bacilli.

CASE.—Urinary infection due to colon bacillus; treated with anti-serum and vaccine.

1 volume of patient's blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated twenty minutes. 50 cells contained 116 bacilli.

1 volume of patient's blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated thirty minutes. 50 cells contained 196 bacilli.

It is worth while to notice that such a progression does not *necessarily* occur under the same conditions of experiment.

OBSERVATION. CASE.—Suppuration of thumb.

1 volume of blood, 1 volume of citrated salt suspension of melanin.

Four tubes were prepared and incubated for different periods, with the following results:

Fifteen minutes	...	31	granules	of melanin	in 50	cells.
Thirty minutes	...	28	,,	,,	,, 50	,,
One hour ...	...	29	,,	,,	,, 50	,,
Two hours ...	...	31	,,	,,	,, 50	,,

Here it may be inferred that the immune cells were of lowered activity.

OBSERVATION. *Normal blood.*—In the case of normal blood, a slight progression of phagocytosis may be observed.

1 volume of normal blood, 1 volume of citrated salt suspension of melanin.

Four tubes were prepared and incubated for different periods, with the following results:

Fifteen minutes	...	18	granules	of melanin	in 50	cells.
Thirty minutes	...	16	,,	,,	,, 50	,,
One hour ...	...	26	,,	,,	,, 50	,,
Two hours . .	...	31	,,	,,	,, 50	,,

Here, again, the progression might be due to a further formation of opsonin or to the further time allowed for the process of ingesting.

The progressive phagocytosis in normal blood is more forcibly shown in the following observation, where colon bacilli are used in place of melanin.

1 volume of normal blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated twenty minutes. 50 cells contained 151 bacilli.

1 volume of normal blood, 1 volume of citrated salt suspension of colon bacilli.
Incubated thirty minutes. 50 cells contained 399 bacilli.

In considering whether the index obtained by using immune cells in immune serum *in vitro* correctly represents the resistance of the patient's blood, *i.e.*, of his serum and his cells, as distinct from the resistance brought about by his serum alone, the question with which we are essentially concerned is whether a further formation of opsonin occurs *in vitro* or whether the work done by the cells is done by means of the opsonin which was present in the blood when the latter was drawn. We endeavoured to determine this by means of the following experiment: 1 volume of washed immune cells was thoroughly mixed with 1 volume of immune serum, using larger volumes than usual; the mixture was then drawn up into three capillary tubes of the usual calibre and incubated for twenty minutes, thirty minutes, and one hour. At the end of these intervals an equal volume of citrated salt suspension of living colon bacilli was added to the contents of each capillary tube, mixed, and each tube then incubated for twenty minutes. By this means a full supply of active immune cells was allowed to act in immune serum for different periods; the phagocytosis was then tested in each case after the same time allowance, viz., twenty minutes.

CASE.—Colon infection of urinary tract; treated with anti-serum and vaccine.

1 volume of immune washed cells and immune serum, incubated twenty minutes;
1 volume of citrated salt suspension of colon bacilli.
50 cells contained 73 bacilli after twenty minutes incubation.

1 volume of immune washed cells and immune serum, incubated thirty minutes;
1 volume of citrated suspension of colon bacilli.
50 cells contained 74 bacilli after twenty minutes incubation.

1 volume of immune washed cells and immune serum, incubated one hour;
1 volume of citrated suspension of colon bacilli.
50 cells contained 81 bacilli after twenty minutes incubation.

Summary and Conclusions from the Foregoing Group of Observations.

It will be evident from the concluding observation that no difference in phagocytosis is brought about within twenty minutes, in different samples of the same immune serum, mixed with the immune cells from the same patient, when bacilli are presented after periods of incubation of twenty minutes, thirty minutes, and one hour; the numbers of bacilli ingested by 50 cells being: 73, 74, 81. This crucial experiment proves that the marked difference in the phagocytosis observed when bacilli are added to immune serum, and incubated for different periods, must be attributed, not to the opsonification of the serum, but to the increased time allowed for the cells in which to ingest.

The practical conclusion we draw is that in order to estimate the full phagocytic resistance of the patient's blood, the cells should be taken into account as well as the serum. The method of making such an estimate is considerably simpler and much more rapid than the estimation of the opsonic index of the serum only, which entails washing normal cells and collecting blood in order to obtain both normal serum and the serum of the patient. It is merely necessary to draw up 1 volume of the patient's blood and 1 volume of a citrated salt suspension of the micro-organism to be used, into the capillary tube, to mix, incubate for twenty minutes, spread the film, and compare the phagocytosis with that of 1 volume of normal blood similarly treated—a slight modification of the technique practised by Leishman. The washed corpuscles, moreover, sometimes tend to cohere in clumps. The central cells of such clusters would fail to reach the bacilli presented in the fluid. This is possibly one explanation of the discrepancies obtained in the numeration of ingested bacilli, even in neighbouring fields of the same slide.

It has been pointed out elsewhere in this communication that, although the action of the immune phagocytes is usually higher than that of the normal cell, yet it may be lower or it may be equal to it. *The cells vary in value like the serum, and the only method of arriving at a correct estimate of the patient's hæmophagocytic resistance is to allow the immune cells to work in the immune serum.*

By Wright's method too low an index is obtained if the patient's cells are acting above the normal level and too high a one if they are acting below it.

Preliminary Communication on the Administration of Tuberculin (T.R.) and other Vaccines by the Mouth, together with (*a*) Normal Saline Solution ; (*b*) Fresh Horse Serum.

By Arthur Latham, M.D.

In conjunction with H. D. Spitta, M.D., and A. C. Inman, M.B.

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It has been conclusively demonstrated by Sir Almroth Wright and others that the treatment of infective disease by vaccines gives brilliantly successful results in many instances. Again, the hypodermic injection of various preparations of tuberculin in cases of chronic pulmonary tuberculosis not only increases the percentage of cases of arrested disease in those undergoing sanatorium treatment, but—more important still—diminishes the tendency to relapse. The use of tuberculins and of other vaccines has not been adopted on a sufficiently large scale by the medical profession. This is probably due to the fact that such treatment, whether in large institutions or in general practice, is attended with considerable difficulty owing to (1) the necessity of employing the hypodermic method of administration, (2) the necessity of making, in most instances, frequent estimations of the opsonic index to determine the proper intervals between the doses of vaccine.

One of the objects of this investigation was the simplification of our present methods.

Calmette and others have shown that there is presumptive evidence that many cases of pulmonary tuberculosis owe their origin to the absorption of living bacilli from the alimentary canal. It is a fact that the body is capable of acquiring immunity by utilising in some obscure way the bodies of dead bacilli. It is therefore probable that many persons owe their immunity to tuberculosis and other infective diseases to the fact that living bacilli, after being absorbed from the alimentary canal and killed, have stimulated the production of antibodies.

It seemed a reasonable assumption that the administration of dead tubercle bacilli or of their products (tuberculin) by the mouth would enable the body to become immunised against the attack of living bacilli. This conclusion was strengthened when, some two months after this investigation was commenced, Calmette, Guérin and Breton published a paper showing that the administration of specially prepared emulsions of dead tubercle bacilli by the mouth conferred immunity upon guinea-pigs, provided that the emulsion was not given together with food.

Koch stated many years ago that tuberculin administered by the mouth would not confer immunity. A number of observers, however, have given tuberculin by the mouth, and some of them with good results. Others have administered it in the shape of suppositories, and Spengler has rubbed it into the skin. So far as the administration by the mouth is concerned, nearly all observers gave tuberculin in the form of capsules or keratin-coated pills. The results obtained do not appear to have been sufficiently striking to induce a continuance of the method. This is probably due to the fact that such methods of administration hinder the proper absorption of the vaccine. In the case of snake poisons, the venom is unaffected by the gastric juice, but is destroyed by the pancreatic juice. Most forms of venom can be given by the mouth without any harmful result, and an interesting point arises as to the part played by the liver after the absorption of the venom from the stomach. Again Copeman has shown that vaccine crusts, when given by the mouth to vaccinate against small-pox, have produced a general vaccinia.

I argued that in all probability vaccines would be absorbed from the stomach if they were given when the stomach was empty and together with some substance which would facilitate absorption, and that if they were absorbed they would necessarily confer immunity.

In the treatment of infective disease the production of antibodies which have a direct effect on the specific poison is unfortunately not always sufficient to produce immunity. The opsonic index may be greatly raised, but the progress of the disease towards a fatal termination may continue unabated. In other cases the administration of vaccines may lead to no response in the production of antibodies, and the opsonic index remains unaffected. Again, the fact that in tuberculosis the amount of the destruction of tissues varies immensely in different cases of pure infection suggests that something besides the direct effect of tuberculin has to be considered. It is possible that some of these facts, or all of them, may have their explanation in some inherent or acquired deficiency in the patient's serum. It is possible that tubercle bacilli in acting on the tissues produce not only tuberculin, but, by their digestive action on the tissues around them, give rise to some side-chain poison, the effect of which is to cause destruction of tissue, to a greater or less extent according to the reacting powers of the patient's serum.

There is a considerable amount of clinical evidence of the value of various antisera in diseases other than the specific disease.

(1) For example, an interesting instance of the value of antidiphtheritic serum in arthritis came under my notice several years ago. A lady who suffered from arthritis of the wrist contracted diphtheria. She was treated with antidiphtheritic serum and recovered; at the same time the old-standing arthritis disappeared. Some years later the arthritis returned; a further dose of the serum led to its permanent disappearance.

(2) I have seen in a number of cases of streptococcic infection great improvement occur contemporaneously with the administration of antistreptococcic serum. Parkinson and others have obtained good results from the administration of antistreptococcic serum in gonococcic infections. William Hunter and others have given antistreptococcic serum with good results in pernicious anæmia, on the ground that streptococci caused the oral sepsis present in many of these cases. As few examples of this serum have been proved to contain any antibodies, Sir Almroth Wright suggested that it acts as a vaccine owing to the toxin it contains. It is a feasible suggestion that it may act *quâ* horse serum.

(3) Recently I brought forward at this Section a few examples of broncho-pneumonia in young children treated in the early months of last year by the hypodermic administration of antidiphtheritic serum. I was led to do this from the remarkable effect which followed the use of this serum in a case which was thought to be possibly one of diphtheria with invasion of the lungs, but which proved to be one of severe broncho-pneumonia. In these cases a marked and progressive fall of temperature followed the use of the serum. I have since found that the same results follow the administration of 10 c.c. of fresh horse serum by the mouth, and I should be glad if someone, with greater opportunities for treating this disease than I have, would give this treatment a trial.

The use of animal serum in the treatment of anæmia was a favourite remedy of our predecessors, and probably dates even to Hippocrates.

In 1902, Laveran and Mesnil (and later Goebel) showed that human serum possessed a definite preventive action and a limited curative action against the infection of guinea-pigs and mice with the trypanosome of Bruce, and that this action probably depended on a globulin.

Weil, early last year, published a paper in which he showed that the hypodermic administration of horse serum or of fresh antidiphtheritic serum increased the coagulability of the blood *in vitro* and in the body, and so checked hæmorrhage and made it possible to operate upon persons suffering from hæmophilia without undue loss of blood. He said it was important not to repeat the dose for a considerable interval for fear of inverse action, and so of increasing the tendency to hæmorrhage. The experience—extending over three years—we had of Marmorek's antituberculous serum negatived this fear. We gave this serum in a large number of cases, sometimes daily for weeks at a time, and, if anything, found that hæmoptysis was less common under its use than in other untreated cases. I would say in passing that Marmorek's serum produced beneficial results in a number of cases of surgical tuberculosis and also in a certain proportion of cases of pulmonary tuberculosis. It often caused a rise of temperature, and in a number of cases no improvement set in until some time after its use had been discontinued. In other words, it does not produce passive immunity, but acts as a vaccine, and possibly consists of horse serum and tuberculin, the dose of the latter being uncertain and unstandardised. It was my experience with Marmorek's serum which first suggested to me the possibility that a combination of horse serum and a known dose of tuberculin might be of value in the treatment of tuberculosis. Serum effects—some of them alarming—were common when this serum was injected under the skin; but these did not appear when, early in 1906, we adopted Marmorek's suggestion of administering it by the rectum, or in the few cases in which Dr. Hector Mackenzie gave it by the mouth. Again, the work of Paton, who, in his book on serum therapy, has brought forward many interesting and suggestive statements of the value of antidiphtheritic serum and of horse, sheep, and ox "plasma" in a variety of diseases, when administered by the mouth, shows that serum can be given in repeated doses without undesirable results.

E. C. Hort, who is responsible in this country for showing the therapeutic possibilities of the oral administration of fresh horse serum, and to whose work in this direction I am much indebted, has carried Weil's investigation further and has shown that the free oral administration of fresh horse serum is of great service in many cases of hæmorrhage of toxic origin, such as pulmonary hæmoptysis. He has also brought forward suggestive evidence that, when given for hæmatemesis, this serum not only causes the hæmorrhage to cease but relieves gastric pain, and when persisted in leads to a rapid recovery of health. So far as my own experience goes I have not been able to satisfy myself of these secondary results. In a suggestive article this author has argued that in such diseases as gastric ulcer and gastro-staxis, and in hæmolytic disorders, horse serum limits cytolysis.

It would appear probable, from a consideration of the above, that horse and other animal sera have some therapeutic value. The method of administration appears to be a matter of indifference so long as the serum is fresh, with the exception that serum disease is markedly less frequent when serum is given by the mouth or rectum than when it is given under the skin. Various observers have obtained good results from the oral administration of antidiphtheritic serum in diphtheria. Parkinson and Marmorek obtained good results by administering various sera by the rectum. Paton gave antidiphtheritic serum and the "plasma" of various animals by the mouth, and Hort has obtained good results from the oral administration of fresh horse serum.

In view of these facts I determined to try the effect of the oral administration of fresh horse serum in infective disease, to see whether it was able to supply some substance in which the patient's serum was deficient, or to stimulate the production of some such substance, or whether it had any other action.

This investigation was commenced last November at St. George's Hospital, where several hundred opsonic determinations were made by Dr. Spitta. In many cases a daily determination was made; in some the opsonic index was taken twice a day. At the end of three months a considerable amount of information was obtained, and patients were then treated at the Brompton Hospital for Consumption. At this hospital the patients were seen by me daily, and sometimes twice daily, in consultation with Dr. Inman, who made 800 to 900 opsonic determinations.

Although this paper is necessarily written by me, and I am necessarily chiefly responsible for the opinions expressed in it (as I commenced the investigation as a clinical investigation and have been responsible for the clinical treatment of the patients), yet I wish to take this opportunity of stating that the results would have been much less convincing, and that the relation of the opsonic index to the temperature would not have been demonstrated, if I had not had the great advantage of Dr. Spitta's laborious work and ready information on bacteriological questions, or if at the Brompton Hospital it had not been possible for me not only to take advantage of Dr. Inman's laborious work and extensive knowledge of tuberculosis, but to meet him in daily consultation.

CLINICAL RESULTS.

In the great majority of the following cases the treatment by vaccines was determined on purely clinical data and without reference to the opsonic index. In fact, in many no observations were made of the index.

Cases of Staphylococcic Infection.

A. B., aged 29, potman (fig. 1); admitted to St. George's Hospital on January 18, 1908. Patient first noticed a "black swelling" on the ulnar side of the wrist fourteen days ago. His doctor lanced the swelling; subsequently a large number of boils came out over his face, neck, arms and chest. Patient was seen by Mr. Jaffrey, who ordered the application of goulard and opium. The material removed from one of the boils contained staphylococci; the opsonic index to this organism was 1·41. The temperature steadily rose till it reached 102° F. on January 21. On January 22, 100 millions of dead staphylococci in 10 c.c. of fresh horse serum were given by the mouth. In a few hours there was great relief from the pain in the wrist, whilst the temperature fell to normal. The following day Mr. Jaffrey found it necessary to make still further incisions in the arm. By January 24 the boils had practically disappeared except for the presence of a few scabs, and no fresh ones developed subsequently. The inflammation in the neighbourhood of the wrist ceased to extend, but the wounds took a considerable time before they healed satisfactorily. Further doses of vaccine were given on January 28 and February 5 and 10.

J. B., aged 43, housemaid, was first seen on February 5. A month before the patient suffered from an abscess on the right side of the neck just above the right shoulder-blade. The abscess was opened ten days before admission to St. George's Hospital; subsequently a large number of boils, some almost the size of a filbert nut, and many of them suppurating, had appeared. On February 5 the patient was given by the mouth 100 millions of stock staphylococci in 10 c.c. of horse serum. As a result the boils ceased to grow in size and became less indurated. A further dose of 250 millions of stock staphylococci in 10 c.c. of horse serum was given on February 12 and 17. After February 16 no fresh pustules appeared, but the boils did not show much evidence of improvement except that they were a little smaller and less indurated. On February 20, 250 millions of the patient's own staphylococci, prepared from one of the boils, in 10 c.c. of horse serum were administered with immediate effect. The boils rapidly diminished in size and no fresh pustules appeared. A further dose of 250 millions of the patient's staphylococci in 10 c.c. of horse serum was given on February 27. On March 3 patient was discharged well.

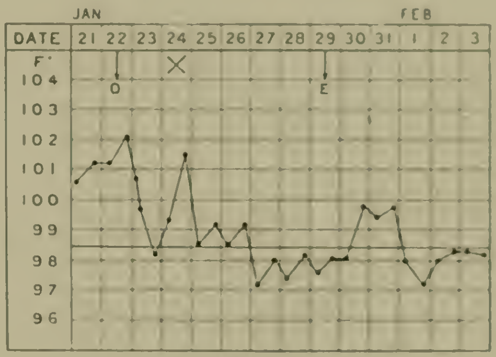


FIG. 1.

Chart showing the effect of the oral administration of stock Staphylococci upon the Temperature.

(D) 100 million staphylococci and 10 c.c. horse serum by the mouth, followed by immediate fall of temperature and disappearance of boils.

(×) Abscess opened.

(E) 250 million staphylococci and 10 c.c. horse serum, followed by temporary negative phase and increased temperature.

F. H., aged 23, labourer; first seen on January 30. Six years ago patient began to suffer from boils on the neck, and had continued to have boils in that situation the whole of this time; occasionally had had some boils on his arm or trunk in addition. On admission to St. George's Hospital there were seven small boils—three being the size of a marble—on the neck and a number of sebaceous cysts. Staphylococci were isolated from one of the boils. On February 1, 100 millions of stock staphylococci in 10 c.c. of horse serum were given by the mouth. On February 5, as two boils discharged freely and there was one fresh pustule, 100 millions of stock staphylococci in 10 c.c. horse serum were again given by the mouth. Two hours after the patient had a rise in temperature to 101° F., but the temperature became normal in three hours. On February 8 the boils were somewhat smaller, but a fresh pustule had appeared; 250 millions of stock staphylococci in 10 c.c. of serum were therefore given by the mouth. By February 12 the boils had entirely disappeared. The patient had a number of decayed teeth, and these were now removed. On February 13 the man was discharged cured. He has had no further recurrence of the boils.

Case of Tuberculous, Staphylococcic and Streptococcic Infection.

G. C., aged 3; patient was admitted to the hospital on November 21, 1907. A number of tuberculous glands were present in the posterior triangle on the left side of the neck, whilst in the right anterior triangle of the neck numerous enlarged tuberculous glands and a discharging sinus were present. The sinus followed an operation before admission, at which a caseating tuberculous gland was removed. On December 4 10 c.c. of horse serum and $\frac{1}{1000}$ mg. of tuberculin were given by the mouth. This treatment was continued at varying intervals, with occasional doses on two successive days; the largest dose given was $\frac{1}{1000}$ mg. of tuberculin, and the smallest $\frac{1}{4000}$ mg. In three weeks the glands on the left side of the neck had disappeared; the glands on the right side of the neck were somewhat smaller, but the discharge from the sinus was more copious. Staphylococci and streptococci were isolated from the discharge, and on January 15, 100 millions of stock staphylococci and 10 millions of the patient's own streptococci were given by the mouth, together with 10 c.c. of horse serum. As a result the patient's temperature rose to 102° F. and remained raised for four days. The rise of temperature was accompanied by a profuse serum rash. [This is one of three instances I have seen of serum rash produced by the administration of serum by the mouth. In all cases the rash followed the administration of serum and staphylococci. In one case urticaria followed the oral administration of tuberculin in normal saline solution. The urticaria was quickly controlled by a 1 dr. dose of calcium lactate.] The effect of the vaccine on the discharge was very marked; it immediately became less, and in six days had disappeared. The wound gradually healed, and with a further administration of tuberculin in saline solution the glands on the right side of the neck gradually became smaller. On March 10 the patient, who had left hospital some weeks previously, was in excellent condition. One fibrous gland could be easily felt on the right side of the neck; the other glands had disappeared. The patient is under treatment as an out-patient.

Case of Tuberculous and Staphylococcic Infection.

A. K., aged 31, butler. Admitted to St. George's Hospital on February 11, 1908, under the care of Mr. Jaffrey. Patient had been an in-patient on three former occasions and had undergone four operations for tuberculous glands on the right side of the neck, the last being in 1907. He had been fairly well until a few weeks ago, when his neck again became swollen and tender. There was a slight discharge at one spot. On admission there were scars of previous operations, one along the outer border of the pectoralis major, one at the base of the neck in the posterior triangle, and one parallel to each border of the sterno-mastoid in the upper part of the neck. Between the two last-mentioned scars was a hard brawny area, tender and somewhat red. Behind the angle of the jaws were one or two small discrete glands, but apart from this the outline of the mass was indefinite. There was a gland the size of a pigeon's egg in the right axilla. Temperature on admission was 99·4° F. Staphylococci were isolated from the discharge. On February 15 patient was given 10 c.c. of serum and 100 millions of staphylococci. Three days afterwards patient developed a serum flush, fever to 101° F., and a sore throat. On February 19 the temperature was again normal. The swelling in the neck was much softer and smaller. The patient was then treated with tuberculin, $\frac{1}{1000}$ mg., and saline solution from time to time. On March 13 10 c.c. of serum and 150 millions of staphylococci were again given. Three days afterwards the patient suffered from serum flush and temperature of 101° F. The temperature became normal on March 20. The hard brawny swelling has practically disappeared, one side of the neck being the size of the other. All pain and redness have gone and the glands in the neck and the one in the axilla have diminished considerably in size. The temperature is normal. Patient is under treatment as an out-patient.

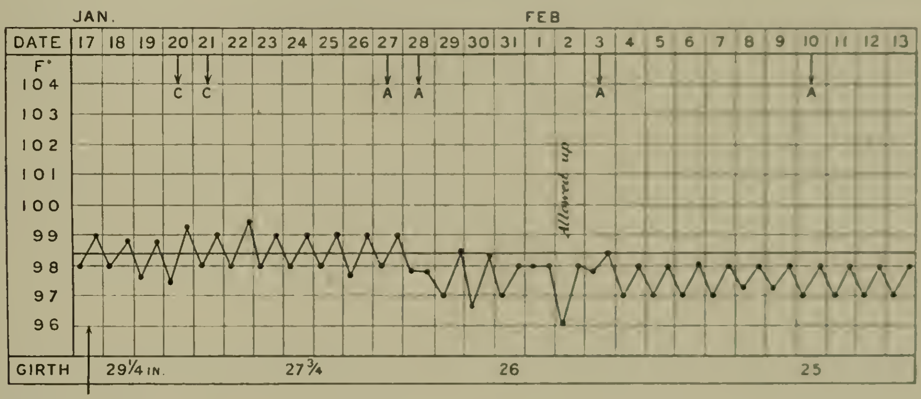
Case of Early ("Closed") Pulmonary Tuberculosis, together with Tuberculous Infection of the Glands.

F. L., 33, married, was seen at the Throat Hospital, Golden Square, in December, 1907, in consultation with Mr. Rose. She was suffering from a swelling on the left side of the neck below and behind the angle of the jaw, which was about the size of a hen's egg. The skin was slightly reddened; the patient said that she noticed a lump some six or more months previously, and it had gradually been getting larger and more tender and swollen. The teeth were normal and the clinical diagnosis was that of enlarged tuberculous glands, which were on the point of breaking down. She was referred to me to know whether the condition of her lungs rendered an operation inadvisable. On examination there was slightly impaired movement at the apex of the right lung, together with a deficient entry there, and a few crepitations, especially on coughing at the end of inspiration. There was no sputum. The diagnosis of "closed" tuberculosis at the apex of the right lung was made, and I suggested that the effect of tuberculin should be tried before an operation was performed. She was accordingly admitted to St. George's Hospital on January 13, 1908. On admission on the first two days the evening temperature was 99·8° F. Physical signs in the lungs remained as before. The Calmette (Hoechst) test gave a marked reaction. [I would say in passing that I have very little belief in the efficiency of this test, and that, in view of certain cases which have come under my notice, I regard it as likely to lead to most undesirable results unless given with great discrimination.] The patient was treated at first with serum and tuberculin, and later with tuberculin in saline solution, the doses varying from $\frac{1}{10000}$ mg. to $\frac{1}{1000}$ mg. On several occasions three doses of $\frac{1}{3000}$ mg. were given at twelve-hourly intervals, with good results.

There has been a gradual improvement in the patient's condition. The adventitious sounds at the apex of the right lung have disappeared; the temperature has been normal for weeks; weight has increased about 5 lb.; the swelling has diminished in size, all redness and sense of fulness having gone. It was soon possible after the tuberculin had been administered to differentiate what appeared to be a bunch of glands into two glands. The patient is being treated as an out-patient.

Cases of Tuberculous Peritonitis.

E. K., aged 17, milliner (fig. 2). Admitted to St. George's Hospital on December 13, 1907. Patient noticed seven weeks before that her abdomen was swelling. She was in bed for six weeks before being admitted to the hospital. On admission ordinary clinical signs of tuberculous peritonitis with effusion were found. Calmette's reaction was positive; the opsonic index before light massage of the abdomen was 0·9 and after 1·3. Temperature was 99° F. to 99·5° F. in the evening for six weeks. During this time the patient was kept in bed, and the administration of tuberculin with saline solution by the mouth was tried, but produced no result. At the end of three weeks the effect of the administration of serum with tuberculin by the mouth was tried, but produced no results. Tuberculin, $\frac{1}{1000}$ mg., in horse serum was then administered on two successive days by the rectum with immediate effect, and similar doses were given subsequently. The fluid in the abdomen was rapidly absorbed and, at the end of a fortnight's treatment, had disappeared. Immediately after the administration of the tuberculin with serum on the second two days the temperature became normal and remained normal or subnormal. The patient was discharged one month after the commencement of treatment by the administration of tuberculin by the rectum, and is now in perfect health.



Sixth week of
fever in bed.

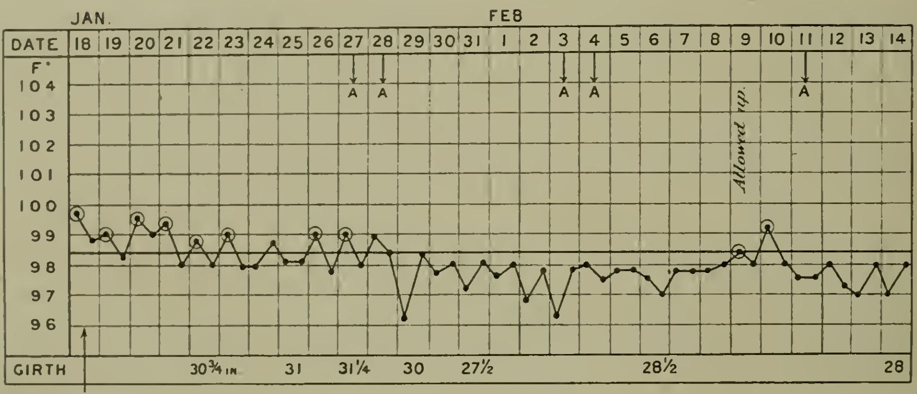
FIG. 2.

Chart showing effect of rectal administration of Tuberculin and Horse Serum in tuberculous peritonitis with effusion.

(C) $\frac{1}{1000}$ mg. tuberculin, 5 c.c. horse serum.
(A) $\frac{1}{1000}$ mg. tuberculin, 10 c.c. horse serum.

A. C., aged 28, housemaid (fig. 3). Admitted December 21, 1907. Patient was sent into the hospital with a diagnosis of enteric fever, having been ill with general pains and fever for three weeks before admission. On admission temperature was 103° F., but no evidence could be found to support the diagnosis of enteric fever. The abdomen was puffy, but no diagnosis of tuberculosis was made until January 10, when there was evidence of a small quantity of fluid in the abdomen. The patient gave a positive Calmette reaction, but the opsonic index was not taken. The temperature gradually came down till it reached

99° F. on January 21. Meanwhile the fluid was accumulating in the abdomen till the girth increased to 31 in. On January 27 and 28, 10 c.c. of serum and $\frac{1}{1000}$ mg. of tuberculin were administered by the rectum. The temperature immediately became subnormal and remained so until the patient left the hospital, with the single exception that it went to 99° F. on the day after the patient was first allowed up, namely, fourteen days after the commencement of treatment. The fluid rapidly decreased till the girth measured 28 in. The patient is now in robust health.

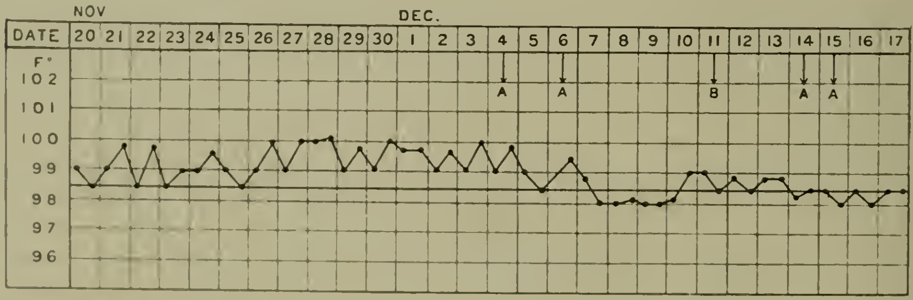


Fifth week of fever in bed.

FIG. 3.

Chart showing effect of rectal administration of Tuberculin and Horse Serum in tuberculous peritonitis with effusion.

(A) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. horse serum.



Third week.

FIG. 4.

Chart showing effect of oral administration of Tuberculin and Horse Serum in a case of tuberculous disease of the hip-joint.

(A) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. horse serum.
(B) $\frac{1}{500}$ mg. tuberculin and 10 c.c. horse serum.

Case of Tuberculous Disease of the Hip.

F. T., aged 15 (fig. 4), admitted to St. George's Hospital under the care of Mr. Pendlebury on November 6 with disease of left hip. Flexion almost impossible at the hip, abduction limited; fluid in the synovial membrane. Kept in bed for one month without improvement, evening temperature being about 100° F. On December 4 the treatment with tuberculin and serum commenced; temperature immediately fell to normal, night pains went, and effusion soon disappeared. The boy was allowed up about January 4 in Thomas's splint; he remains under treatment. The temperature remains normal; the movement of the joint is much freer, flexion being permitted to much greater limits.

Cases of Pulmonary Tuberculosis.

At St. George's Hospital six cases have been treated so far. All are examples of active and extensive disease which had failed to react to ordinary treatment. In all, with one exception, considerable fever was present before treatment was commenced; in all the temperature is now normal. Four of the patients are up and about; in the case of one of the other patients the treatment has not continued sufficiently long to allow movement; in the remaining case the patient has been up and about, with a normal temperature, but on doing too much he suffered from a return of the fever, and although the temperature is again normal he has not yet been allowed to get up again. In the cases in which expectoration persists, tubercle bacilli are still present. In no case has there been any extension of the disease, so far as is shown by the physical signs, since the treatment commenced. In such cases rapid results cannot be expected, and treatment must necessarily be prolonged; but I am satisfied that even in this hopeless class of case tuberculin, judiciously administered, is capable of producing considerable amelioration. In view of the results obtained it is our intention to treat less severe cases on similar lines.

F. R., aged 22, gardener (fig. 5). In June last had an attack of pneumonic tuberculosis, for which he was kept in bed until September; went to Eastbourne for a month, but was in bed most of the time; had fever continuously the whole four months. Admitted to St. George's Hospital on October 8, 1907, and kept in bed for one month, with fever the whole time. On admission there was caseous tuberculosis in left lower lobe with signs of an extensive cavity. On November 6 there were signs of commencing infiltration at the upper part of the left lung and upper part of the right lung. Tuberculin and horse serum were administered by the mouth on this and successive dates. By November 24 the temperature had reached the normal, and with the exception of three occasions for a day or two at a time the temperature has not been

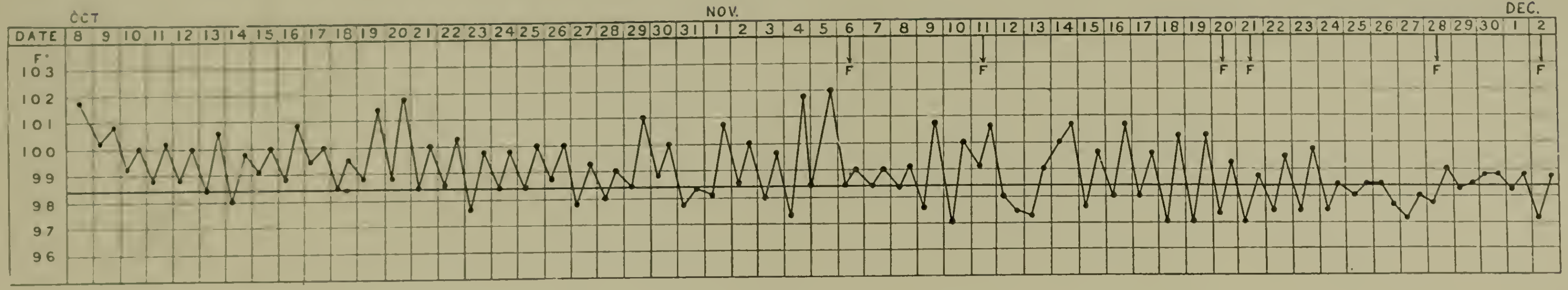


FIG. 5.

Chart showing effect of the oral administration of Tuberculin and Horse Serum in a case of pulmonary tuberculosis in which fever had persisted in spite of complete rest for five months.

(F) $\frac{1}{2000}$ mg. tuberculin and 10 c.c. horse serum, the first dose being given at the end of five months continuous fever in bed.

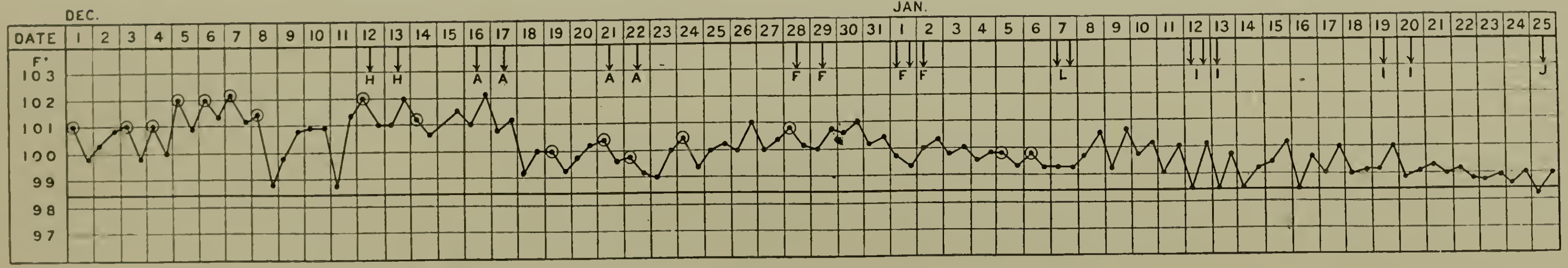


FIG. 6.

Chart showing the effect of the oral administration of Tuberculin and Horse Serum in a case of acute caseating pulmonary tuberculosis.

(H) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. saline solution.
(F) $\frac{1}{2000}$ mg. tuberculin and 10 c.c. horse serum.
(I) $\frac{1}{4000}$ mg. tuberculin and 5 c.c. horse serum.
(A) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. horse serum.
(L) $\frac{1}{2000}$ mg. tuberculin and 5 c.c. horse serum.
(J) $\frac{1}{4000}$ mg. tuberculin and 10 c.c. horse serum.

The change from the inverse type to the normal type of temperature is well shown in this chart.

above 99° F. since. The weight has increased 20 lb., the sputum has diminished from 6 oz. to $\frac{1}{4}$ oz.; the patient is up all day and is taking exercise. Physical signs are those of a dry, contracting cavity.

J. F., aged 36, valet. Patient had been ill with a cough and expectoration for about a year; had lost 13 lb. in the last twelve months; had considerable pain in the left side. Admitted to the hospital on December 14; temperature previous to admission had been 102° F. at night; on admission varied from 99° F. to 101° F. Physical signs, those of tuberculous infiltration of the upper third of the right lung with pleurisy at the base, and at the upper two-thirds of the left side there were signs of breaking down. Treated with tuberculin and horse serum. Expectoration has diminished considerably, but the weight has not increased; temperature is normal and the man is taking slight exercise.

H. H., aged 20, plasterer (fig. 6). Admitted on December 1. Taken ill four weeks previously with rigors, shortness of breath, cough with expectoration, and fever; this was accompanied by rapid loss of weight. Admitted to hospital under care of Dr. Rolleston; on admission there were signs of tuberculous infiltration in the whole of the right lung; the left lung was healthy. The right lung rapidly broke down and a large cavity developed in the right lower lobe; this was accompanied by a very painful pleurisy. On December 14 patient complained of pain in the left groin; a number of enlarged superficial glands were found in that situation and some induration about the saphenous vein. On December 15 thrombosis of the right saphenous vein extended from the knee-joint to the groin, and the condition of the patient was most critical. On this date the patient was treated with tuberculin in saline solution, administered by the mouth, on two successive days; no apparent effect followed; the patient was therefore given horse serum and tuberculin by the mouth, and this treatment was continued until the temperature became 99° F., when tuberculin in saline solution was administered. Expectoration has practically ceased; weight has increased by 12 lb.; the temperature has been under 99° F. for over a month and is now normal. An inverse type of temperature was present at the commencement, but has disappeared, and the man is up and taking gentle exercise.

J. B., aged 26, coach painter. Patient was admitted to the hospital on November 13 with a history of long-standing pulmonary tuberculosis; during the last three weeks lost 6 lb. and suffered from profuse sweating. Physical signs were those of tuberculous infiltration of the whole of the right lung, with breaking down at the apex of the right lower lobe, and there were signs of infiltration of the left upper lobe. The temperature was normal. The patient has been treated with tuberculin in saline solution, administered by the mouth, the doses having been gradually increased from $\frac{1}{1000}$ mg. to $\frac{1}{200}$ mg. Since his admission to the hospital the temperature has been normal; night sweats have disappeared and expectoration has entirely ceased; physical signs are those of chronic fibroid tuberculosis. The weight has increased 16 lb. The man, for the last two or three months, has been taking several hours exercise a day.

W. B., aged 22, carman. Admitted on November 21, 1907. History of cough, sweating, loss of weight, for about three months. Physical signs, those of infiltration of the upper two-thirds of both lungs; much dyspnœa and cyanosis present; evening temperature on admission, 100° F. Patient was treated with tuberculin and horse serum. Temperature is now normal; physical signs are much less marked; cough is less, expectoration diminished. Patient was up for some weeks, but in view of the fact that he over exerted himself and so caused a temporary return of fever he is at present in bed.

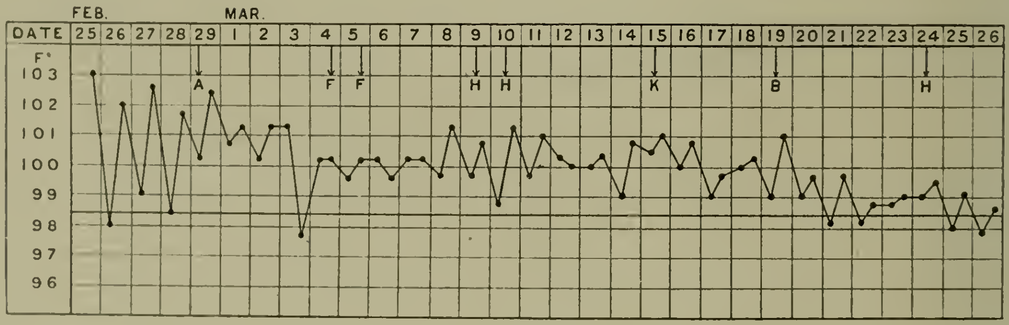


Fig. 7.

Chart showing effect of oral administration of Tuberculin and Horse Serum in a case of pulmonary tuberculosis, five lobes being affected.

(A) 10 c.c. horse serum.
(F) $\frac{1}{2000}$ mg. tuberculin and 10 c.c. horse serum.
(H) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. horse serum.
(K) $\frac{1}{500}$ mg. tuberculin and 10 c.c. saline solution.
(B) $\frac{1}{500}$ mg. tuberculin and 10 c.c. horse serum.

H. S., aged 24, footman (fig. 7); history of disease for six months. In-patient at Charing Cross Hospital. Progressive loss of weight; temperature at night for about six weeks, 102° F. Seen in consultation with Dr. Vernon Jones. Extensive disease in five lobes with breaking down of lung tissue; considerable cyanosis; troublesome cough. Patient losing ground rapidly. On February 25 10 c.c. horse serum given by the mouth ; on February 28 moved to St. George's ; treated with tuberculin in horse serum on February 29 and subsequently with tuberculin in serum or normal saline solution. Temperature immediately affected and oscillation less marked. Temperature normal on March 22. Cough now slight and less troublesome ; expectoration less ; cyanosis much less.

At the Brompton Hospital treatment was not commenced until the end of January, and we have devoted ourselves chiefly to obtaining information. The results of treatment must therefore be published later. So far seven cases have been treated. All were of a severe type, and all had failed to show improvement under prolonged treatment on ordinary lines. In none has there been any extension of the disease since the treatment was commenced. All were under Dr. Hector Mackenzie's care.

(1) H., male, eleven years history. Previously in-patient at the hospital, later at a sanatorium. Admitted eighteen weeks previous to treatment, but had not shown improvement. Three lobes affected and large cavity present. The temperature is now normal and the patient allowed up for five hours ; the sputum has diminished from 17 oz. to 5 oz. and contains very small numbers of tubercle bacilli.

(2) M., male, six months history. Two lobes affected ; disease extending ; acute pleurisy present. Temperature now normal ; expectoration scanty and contains an occasional bacillus ; patient up and in grounds.

(3) G., male, twenty-four months history. In bed in the hospital for two months without improvement. Considerable fever of inverse type. Three lobes affected ; pleurisy present. Temperature now approaching normal, and inverse type replaced by ordinary type.

Cases of Pneumococcic Infection.

P. S., aged 35, grocer's assistant (fig. 8). Patient was seized with a rigor on Friday, February 7, in the evening. The patient was admitted to St. George's Hospital on Sunday evening, February 9, when he was found to be suffering from pneumonic consolidation of the left lower lobe. On Monday morning the left upper lobe was also consolidated. The temperature was 104° F. 100 millions of stock pneumococci in 20 c.c. serum were given by the mouth on Monday at 10 a.m.—that is, sixty hours after the initial rigor. In eight hours profuse perspiration occurred and the temperature fell and continued to fall, reaching the normal on the fifth day of the disease. A week later the patient had a patch of consolidation in the right lower lobe, and the temperature rose again to 102° F. Subsequently an empyema developed on the left side, necessitating drainage. The patient is now doing well.

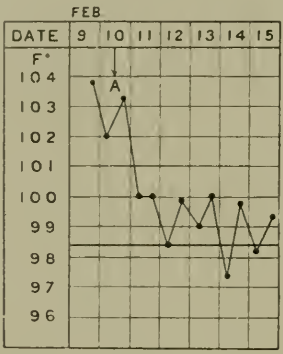


Fig. 8.

Chart showing the effect of the oral administration of stock Pneumococci and Horse Serum in a case of pneumonia.

(A) 100 million stock pneumococci in 20 c.c. horse serum, administered at the sixtieth hour of the disease.

George B., aged 2 (fig. 9). Patient suffered from pain in the chest and dyspnœa on the evening of February 24. He was admitted to the hospital on the morning of February 25, when he was found to have pneumonic consolidation of the upper left lobe; the temperature was 104° F. 10 millions of stock pneumococci in 10 c.c. of horse serum were administered by the mouth. In eight hours profuse perspiration occurred, and the temperature steadily fell, but did not reach the normal until March 5.

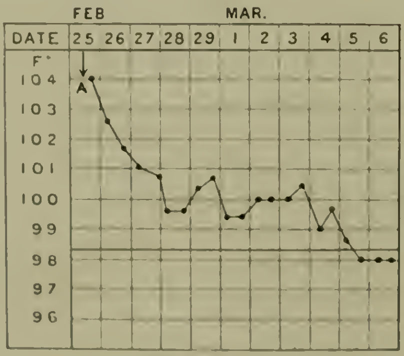


Fig. 9.

Chart showing the effect of the oral administration of stock Pneumococci and Horse Serum in a case of pneumonia.

(A) 10 million stock pneumococci and 10 c.c. horse serum, administered at the fiftieth hour of the disease.

These two examples are given to show that the administration of pneumococci, even stock pneumococci, by the mouth have a definite effect upon the temperature in pneumonia. Probably better results would be obtained by the administration of somewhat larger doses in normal saline solution. I have recently had under my care at St. George's Hospital a boy, aged 16, who was admitted on the second day of the disease with consolidation of upper right lobe ; temperature 102° F. He received 100 millions of stock pneumococci under the skin on admission. Just as in the two previous cases, there was profuse sweating and the temperature fell in from six to eight hours after the injection. The temperature fell to normal and remained there, recovery being uneventful.

THE EFFECTS OF TUBERCULIN (T.R.) WHEN ADMINISTERED BY THE MOUTH.

We have confined ourselves in the treatment of tuberculosis to observing the effect produced by tuberculin (T.R.) as it is perhaps the preparation capable of doing least harm ; we intend to investigate now the value of the other preparations in addition.

Tuberculin (T.R.), when given by the mouth, together with some vehicle such as normal saline solution which promotes absorption, is absorbed and produces practically the same results as when it is injected under the skin. That it is absorbed satisfactorily is shown by the fact that the smallest dose given in this investigation produced an immediate rise in the opsonic content of the blood. This dose was $\frac{1}{20000}$ mg., which in reality represents $\frac{1}{100000}$ mg. or $\frac{1}{100000000}$ grm. Administered in this way tuberculin stimulates the production of antibodies, and so raises the opsonic content of the blood and confers immunity. The negative phase after absorption appears to be shorter and less marked when tuberculin is given in this way than it is when the hypodermic method is employed. Similarly the positive phase has a shorter duration, and so far as this investigation has gone seldom lasts for more than five days. This positive phase, however, is often succeeded by a short negative phase, and then by a more prolonged positive phase (figs. 10 to 14).

Simultaneously with the improvement in the immunity curve produced by tuberculin there is an improvement in the patient's condition. The temperature falls, the cough becomes less troublesome, expectoration is greatly diminished and the patient has a sensation of well-being.

A curious point is the effect of tuberculin on what is known as an inverse temperature. This type of temperature is associated with

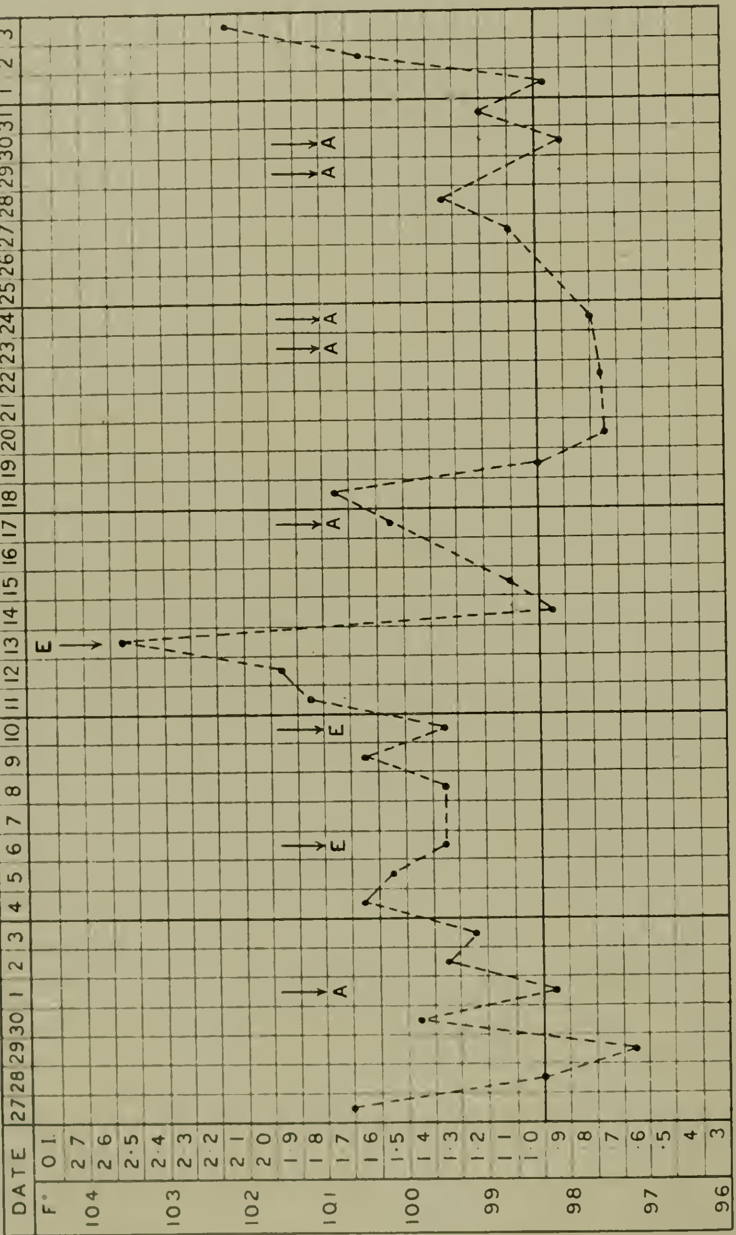


Fig. 10.

Chart showing the effect of the oral administration of Tuberculin and Normal Saline Solution on the opsonic curve in a case of pulmonary tuberculosis (Dr. Spitta).

This curve is the first curve obtained at the St. George's Hospital as the result of the administration of tuberculin and saline solution and is not selected. The first four days represent the curve of auto-inoculation before the administration of tuberculin. The index was taken once daily.

(A) $\frac{1}{1000}$ mg. tuberculin. (E) $\frac{1}{500}$ mg. tuberculin.

miliary tuberculosis, and when it is present the prognosis is always grave. In the three cases so far treated in which this type of temperature had persisted for weeks, an almost immediate return to the normal type of temperature followed the administration of tuberculin.

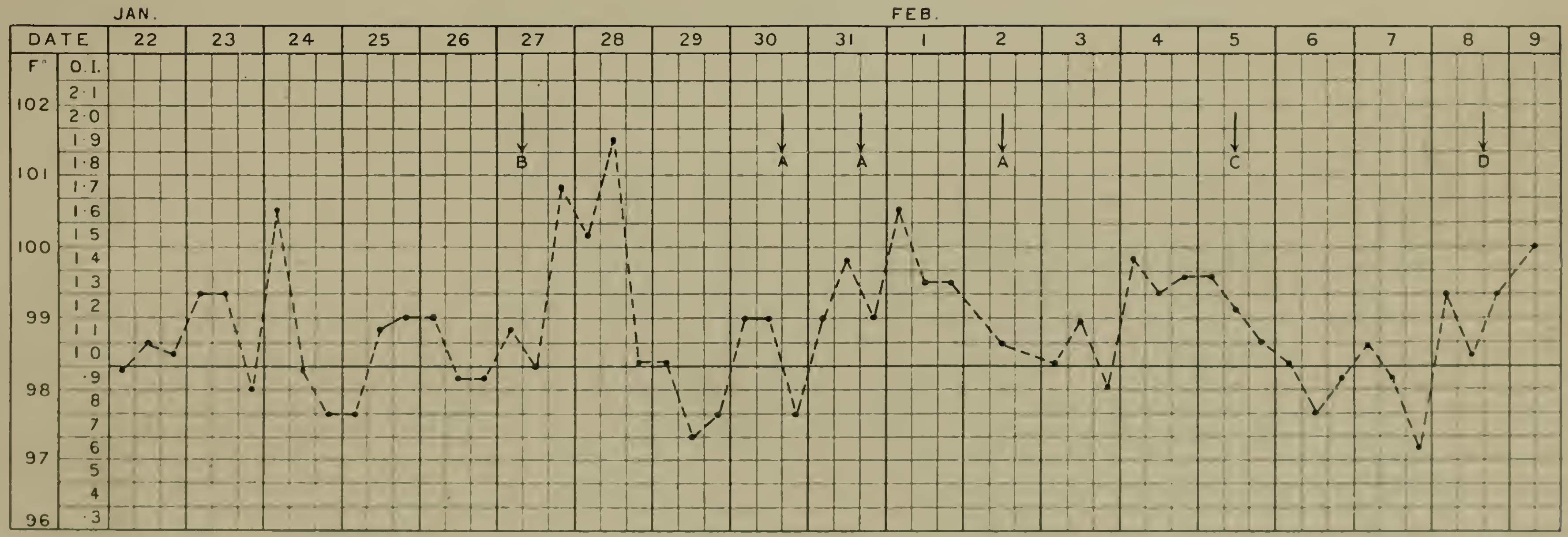


FIG. 11.

Chart showing the effect of the oral administration of Tuberculin in Normal Saline Solution upon the opsonic curve in a case of pulmonary tuberculosis (Dr. Inman). This curve is the first obtained at the Brompton Hospital as the result of the administration of tuberculin and saline solution, and is not selected. The index was taken three times a day.

The first four days represent the curve of auto-inoculation before the administration of tuberculin.

(B) $\frac{1}{20000}$ mg. tuberculin. (A) $\frac{1}{10000}$ mg.
(C) $\frac{1}{5000}$ mg. (D) $\frac{1}{2000}$ mg.

This is one more proof that tuberculin judiciously given prevents the extension of the disease.

Tuberculin administered by the mouth may probably be used for purposes of diagnosis, but that is a point which requires further investigation. In the case of a boy of markedly tuberculous aspect, who suffered from pain in the abdomen and slight fever, the clinical picture suggested tuberculosis of the mesenteric glands, but a definite diagnosis could not be made. $\frac{1}{500}$ mg. tuberculin given by the rectum caused a marked increase in pain and a rise of temperature to 102° F., thus making the diagnosis clear. Again, in the case of a girl suffering from extreme chlorosis and with an evening temperature of 99° F. to 100° F., which had persisted for several weeks, a tentative diagnosis of tuberculosis was made. $\frac{1}{2000}$ grm. tuberculin was administered by the mouth; the temperature became normal for the first time for weeks, then rose again, and finally returned to normal on the administration

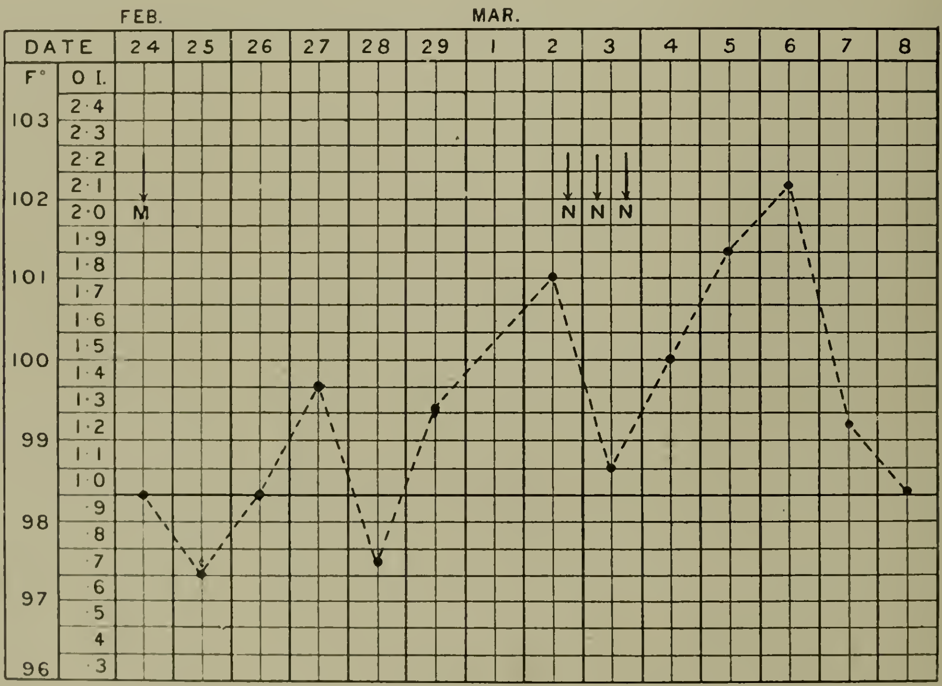


Fig. 12.

Chart showing the effect of the oral administration of Tuberculin in Saline Solution upon the opsonic curve in a case of pulmonary tuberculosis. This curve is selected. (Dr. Inman.)

(M) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. normal saline.
(N) $\frac{1}{3000}$ mg. tuberculin and 10 c.c. normal saline.

of a further dose. A boy, aged 6, suffering from disease of the hip, was under Mr. Jaffrey's care for three weeks with profuse hæmaturia. The question arose whether the hæmaturia was of tuberculous origin. No tubercle bacilli were found in the urine. $\frac{1}{3000}$ gm. tuberculin was given by the mouth in saline solution. The temperature rose to 102° F. for two days, and there was an almost immediate and complete cessation of the hæmorrhage.

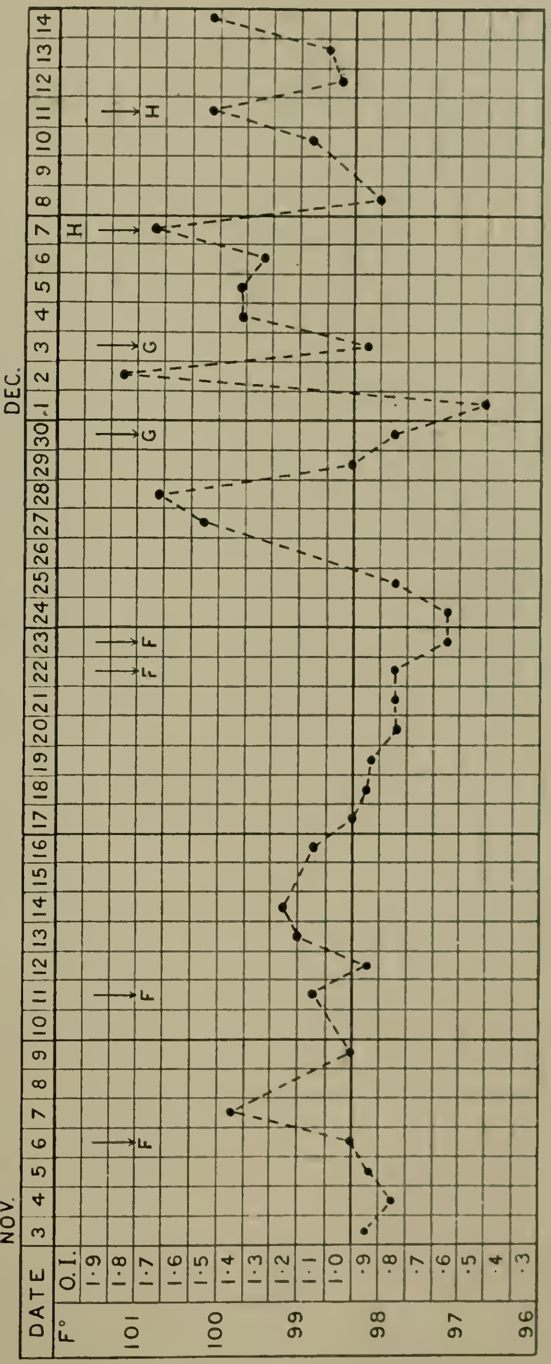


Fig. 13.

Chart showing the effect of the oral administration of Tuberculin and Horse Serum on the opsonic curve in a case of pulmonary tuberculosis (Dr. Spitta).

This curve is the first curve obtained at St. George's Hospital as the result of the administration of tuberculin and horse serum, and is not selected. The first three days represent the curve of auto-inoculation. The index was taken daily.

(F) $\frac{1}{2000}$ mg. tuberculin and 10 c.c. horse serum.
(G) $\frac{1}{1000}$ mg. tuberculin and 10 c.c. horse serum.
(H) $\frac{1}{500}$ mg. tuberculin and 10 c.c. horse serum.

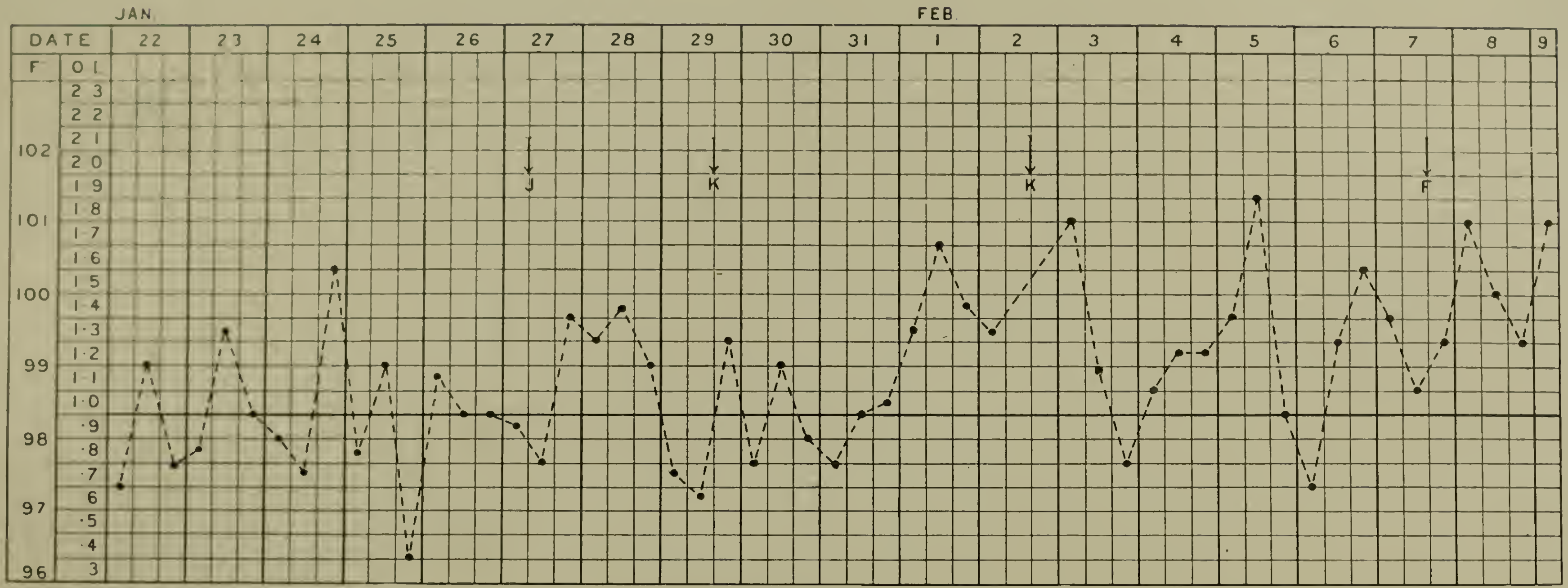


Fig. 14.

Chart showing the effect of the oral administration of Tuberculin and Horse Serum on the opsonic curve in a case of pulmonary tuberculosis (Dr. Inman). This curve is the first curve obtained as the result of the administration of tuberculin and horse serum at the Brompton Hospital, and is not selected. The first five days represent the curve of auto-inoculation before the administration of tuberculin. The index was taken three times a day.

(J) 10 c.c. horse serum.

(K) $\frac{1}{20000}$ mg. tuberculin and 5 c.c. horse serum.

(F) $\frac{1}{2000}$ mg. tuberculin and 10 c.c. horse serum.

THE EFFECT OF STAPHYLOCOCCI AND STREPTOCOCCI AND OTHER VACCINES WHEN ADMINISTERED BY THE MOUTH.

The same clinical effects are produced as when the hypodermic method is employed. It is probable that the duration of both the positive and the negative phase is somewhat shorter when the vaccine is given by the mouth (fig. 15).

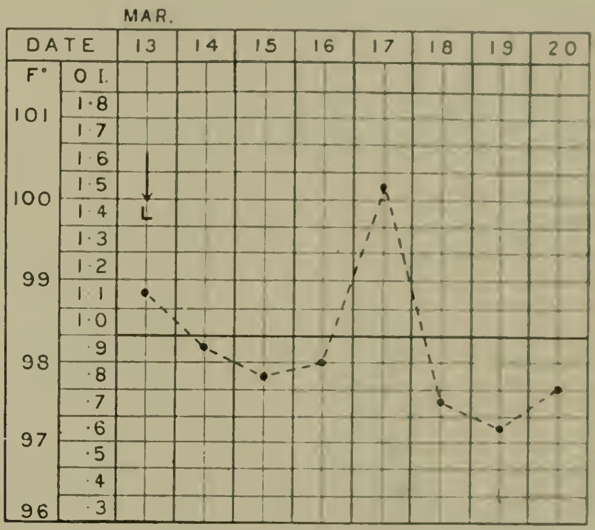


FIG. 15.

Chart showing the effect of the oral administration of stock Staphylococci in a case of tuberculous glands, with secondary staphylococcic infection (Dr. H. W. Bayly).

(L) 150 million staphylococci.

THE DOSE OF TUBERCULIN BY THE MOUTH.

Tuberculin should always be given on an empty stomach. It is, probably, best given in the morning when the resistance is highest, and should be given with something which aids its absorption. I have given it in normal saline solution and in horse serum, and in such cases have added, as a rule, a little milk.

The investigation has not proceeded sufficiently far as yet to permit of any definite rules being laid down, but naturally the dosage follows the same lines as have been found of service when the hypodermic method has been employed. Just as a hypodermic injection of morphia $\frac{1}{4}$ gr. represents $\frac{1}{2}$ gr. when given by the mouth, so it is possible that $\frac{1}{1000}$ mg. of tuberculin by the mouth represents $\frac{1}{2000}$ mg. or less when given by the skin. On the other hand, it is possible that tuberculin is absorbed more quickly through the stomach, and that the more marked phases following hypodermic administration may be due to a slower and more "sustained" absorption. Whether given by the mouth or under the skin, the administration of tuberculin requires the most careful judgment and precise watchfulness of the patient's condition, and of his symptoms, more especially of the temperature. It is possible to cause infinite harm by an overdose or by too frequent doses (figs.

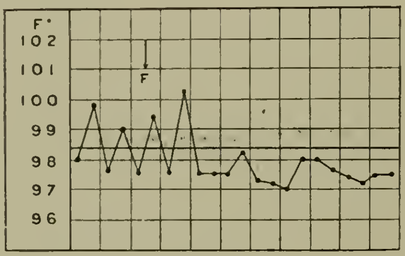


FIG. 16.

Chart showing the effect of the oral administration of Tuberculin on the Temperature in a case of pulmonary tuberculosis.

(F) $\frac{1}{2000}$ mg. tuberculin.

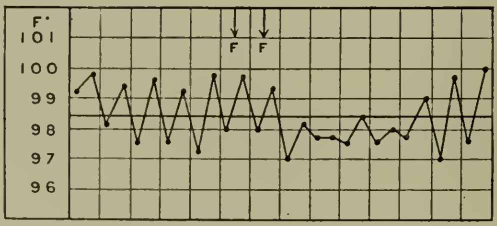


FIG. 17.

Chart showing the effect of the oral administration of Tuberculin on the Temperature in a case of pulmonary tuberculosis.

(F) $\frac{1}{2000}$ mg. tuberculin.

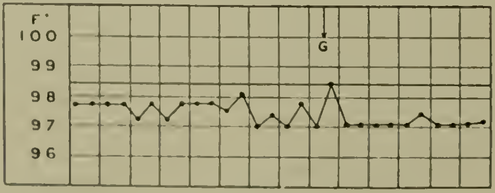


FIG. 18.

Chart showing the effect of the oral administration of Tuberculin on the Temperature in a case of tuberculous glands.

The fluctuation of the temperature corresponded with a fall in the opsonic index. When $\frac{1}{250}$ mg. tuberculin was given (G) the temperature rose and the index fell further; subsequently the temperature was level and the index raised.

20 to 22). Careless or excessive dosage may be attended with fatal results. The abuse of tuberculin and the disregard for these points at the hands of the profession in former years led to its disuse, and set the clock of

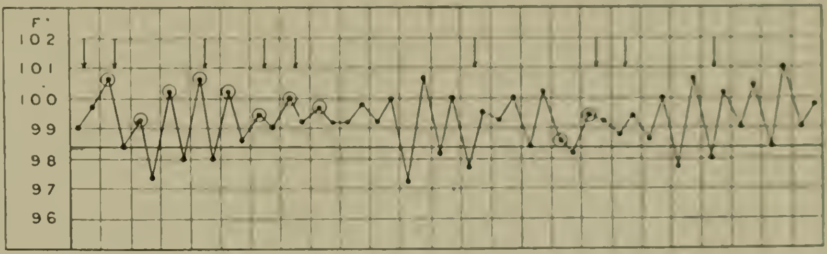


FIG. 19.

Chart showing the effect of the oral administration of Tuberculin upon the Inverse Type of Temperature in a case of pulmonary tuberculosis.

A dose of tuberculin was given at each ↓. The diminution of the oscillation of the temperature which follows the administration of tuberculin in some cases is shown to some extent.

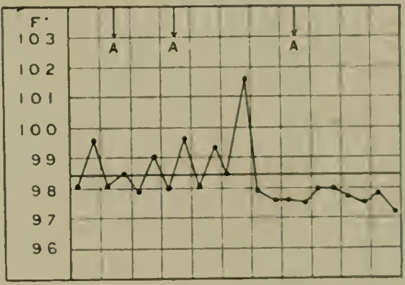


FIG. 20.

Chart showing the effect on the Temperature of an excessive dose of Tuberculin given by the mouth in a case of tuberculous glands.

(A) $\frac{1}{1000}$ mg. tuberculin.

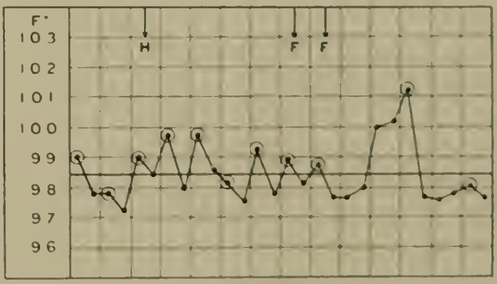


FIG. 21.

Chart showing the effect on the Temperature of an excessive dose of Tuberculin given by the mouth in a case of pulmonary tuberculosis.

(H) $\frac{1}{1000}$ mg. tuberculin.
(F) $\frac{1}{2000}$ mg. tuberculin.

medicine back for nearly twenty years. On the other hand, the careful administration of tuberculin, whether by the mouth or the skin, gives brilliant results. The smallest dose given so far in this investigation is $\frac{1}{20000}$ mg., the largest $\frac{1}{200}$ mg. Doses of $\frac{1}{2000}$ mg. or $\frac{1}{1000}$ mg. have been given on two or three successive days with good results. Doses of $\frac{1}{3000}$ mg. at intervals of twelve hours for two and three successive doses have also been given with good results in those who previously had had $\frac{1}{1000}$ mg. given in a single dose. In febrile cases greater care has to be employed in the question of dosage than in cases of localised disease. The doses of tuberculin have to be increased with much greater caution in febrile cases than in localised cases, and I would emphasise the fact that the tendency in this treatment is to try to go too fast. Any attempt of this kind always results in a rise of temperature and delays improvement. In several febrile cases in which doses of $\frac{1}{2000}$ mg. or more had been given with good effect, a rise of temperature followed the subsequent employment of small doses, such as $\frac{1}{10000}$ mg. A possible explanation of this is that in some febrile cases the tissues are saturated, up to a certain point, with tuberculin, and small doses bring the tuberculin to the tissues in a strength to which they are already accustomed. Irritation and rise of temperature follow; whereas, if a larger dose is given than the tissues are accustomed to, a definite stimulus is applied, a response is called forth, and antibodies are formed.

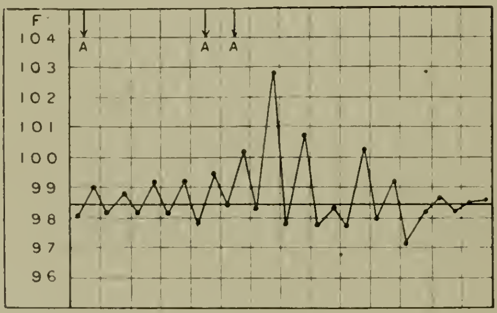


FIG. 22.

Chart showing the effect on the Temperature of an excessive dose of Tuberculin given by the mouth in a case of pulmonary tuberculosis.

(A) $\frac{1}{1000}$ mg. tuberculin.

There are two guides to the dose in a given case. The one is the condition of the patient, the other the temperature. In febrile cases, so far, I have commenced with a dose of $\frac{1}{2000}$ mg. to $\frac{1}{1000}$ mg. In several afebrile cases I have commenced with such doses as

$\frac{1}{10000}$ mg. and then have rapidly increased them. If the dose chosen does good the patient feels better, the temperature falls, and the other symptoms improve. If a dose is too large, the patient in a very short time—sometimes in two hours or less—complains of headache. He is listless and his appetite fails, but there may be but little rise of temperature. If the dose is still further in excess of the patient's requirements the same symptoms occur, and in addition there is a definite rise in the temperature. If sufficient time is allowed to elapse before the next dose is given, these effects—this negative phase—may be followed by considerable improvement, and the same dose may subsequently be tried again. Often, however, smaller doses have to be given. It may be taken as a definite rule that when a dose produces these effects it should not be increased for a considerable time. Even then the increase must be made gradually or bad results will follow. It will be seen that these results of active immunisation by tuberculin follow closely the results of active immunisation, produced by auto-inoculation regulated by graduated exercise, observed by Dr. Paterson and Dr. Inman at Frimley.

It would appear from what is brought forward immediately that once we have learned from a study of the opsonic index what the symptoms and temperature of tuberculosis mean, we can undertake the treatment by means of tuberculin without the necessity of determining the opsonic index, for the simple reason that the more carefully the symptoms of a patient and the curve of his temperature are studied, the more accurately can we say whether his opsonic index is fluctuating or is in a positive or negative phase. As soon as the information obtained in this way shows that a positive phase is waning or a negative phase has commenced, a further dose of tuberculin should be given. The intervals at which further doses are given must be determined in the same way. This, however, can only be carried out satisfactorily (1) by a careful and daily study of the clinical symptoms; (2) by a careful study of the temperature, which should be taken at least every four hours, and preferably in the rectum.

Dose of Staphylococcic and other Vaccines by the Mouth.

The dose of these vaccines when administered by the mouth must be determined on the same lines as have been found useful when the hypodermic method is employed. So far I have used the same dosage with good results, but possibly the dose by the mouth should be slightly larger. The positive and negative phase of the opsonic index can be determined with very fair accuracy by a careful study of the clinical symptoms and the temperature. The doses must be spaced in accordance with the information thus obtained. Apparently the negative and positive phases which follow the administration of vaccines by the mouth are shorter than those produced by the hypodermic method.

THE RELATION OF THE OPSONIC INDEX TO THE TEMPERATURE CURVE AND TO THE CLINICAL SYMPTOMS.

Relation of the Opsonic Index to the Temperature.—A study of the curves, which are shown, demonstrate that there is a definite relation between the changes of phase in the opsonic index and the temperature. Although the temperature does not indicate the precise position of the index, whether, *e.g.*, it stands at 1·8 or 2·3, on a priori reasoning this relation would appear to be a necessity if the opsonic index is a true guide to the immunising capacities of the serum. In tuberculosis, tuberculin is presumably the primary cause of the fever, and the absorption of tuberculin in greater or smaller amounts (auto-inoculation) is the cause of the variations of temperature. Similarly the absorption of tuberculin in greater or smaller amounts calls forth an immunising response to a smaller or greater degree; in other words the absorption of tuberculin is directly responsible for the variations of the opsonic content of the blood, and so of the opsonic index. It is impossible to have any cause producing two results without there being a definite relation between these two results. Consequently the opsonic index and the temperature should show a definite relation. If we look at it in another way the production of antibodies fixes the toxin and so diminishes the "toxin content" of the blood and increases the opsonic content. Anything which diminishes the "toxin content" must diminish fever; hence an increase in the opsonic content should be accompanied by a diminution in fever. The sensitiveness of the apparatus for regulating the temperature is, as we know, marked, and, so far as this investigation has gone, it would appear that the diminution of the "toxin content" (or the increase of the "opsonic content") affects the temperature almost at once.

At the commencement of this investigation at St. George's Hospital the opsonic index was taken daily. I often did not know what it was for a couple of days, and so I treated the patients on purely clinical considerations. When I came to study the temperature curve and the opsonic curve together I was struck with the fact that there was in many instances an inverse relationship, in spite of the fact that the index was taken only once a day, and that we were dealing with acute cases. At the Brompton Hospital this relation was specially investigated, the temperature and opsonic index being taken at the same hour, and the latter being observed for weeks at a time by Dr. Inman three times a day.

I would emphasise the fact that although Dr. Spitta knew whose blood he was investigating he did not know the temperature of the patients, nor did he know when I gave a dose of any vaccine, and that Dr. Inman saw the patients with me, but worked with numbered unknown bloods.

The results obtained so far may be tabulated as follows :—

In Febrile Cases (figs. 23 to 28)—

(1) The opsonic index fluctuates with the temperature, but in an inverse direction: (*a*) When the temperature falls the opsonic index rises; (*b*) when the temperature rises the opsonic index falls.

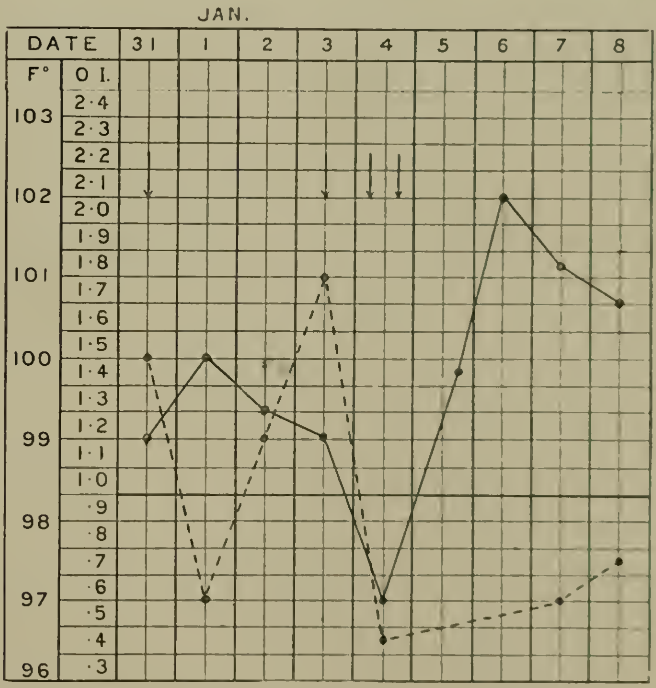


FIG. 23.

Chart showing the relation of the Opsonic Index to the Temperature in a case of pulmonary tuberculosis (Dr. Spitta).

———— Temperature taken at 6 p.m.
- - - - - - - - Opsonic index taken at 3 p.m.

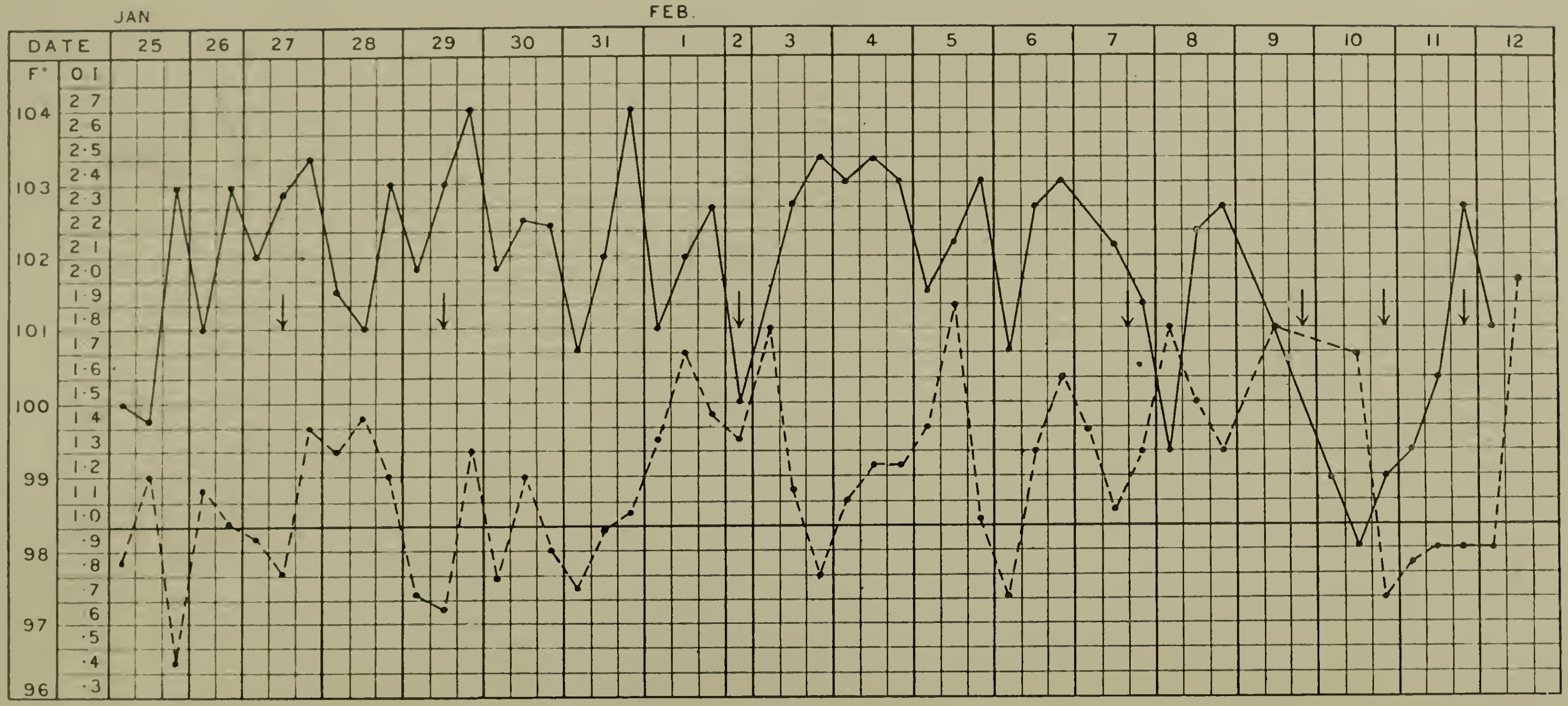


FIG. 24.

Chart showing the relation of the Temperature and the Opsonic Index in a case of acute pulmonary tuberculosis (Dr. Inman).

At ↓ a dose of tuberculin was given.

——— Temperature. - - - - - - - Opsonic index.

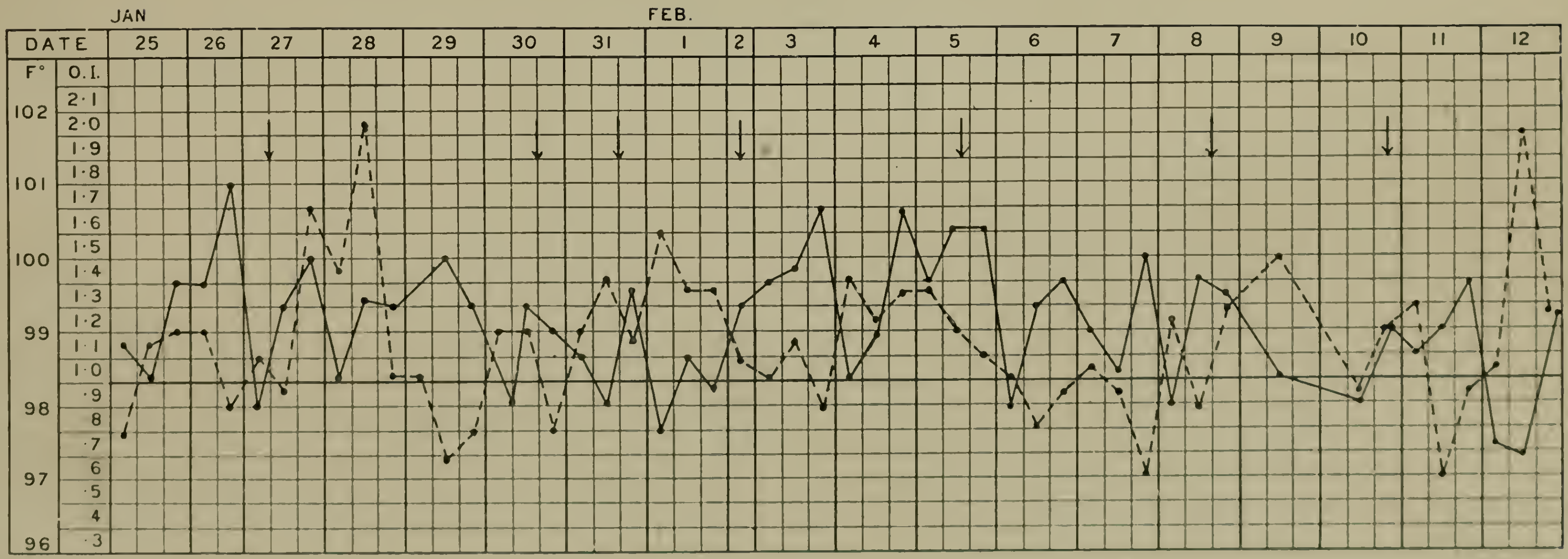


Fig. 25.

Chart showing the relation of the Temperature and the Opsonic Index in a case of acute pulmonary tuberculosis (Dr. Inman).
At ↓ a dose of tuberculin was given.

——— Temperature. - - - - - - - Opsonic index.

(2) When the temperature is persistently high the opsonic index is persistently low.

(3) When the temperature, although remaining at about the same high level, fluctuates to a less degree, there is an improvement in the opsonic index.

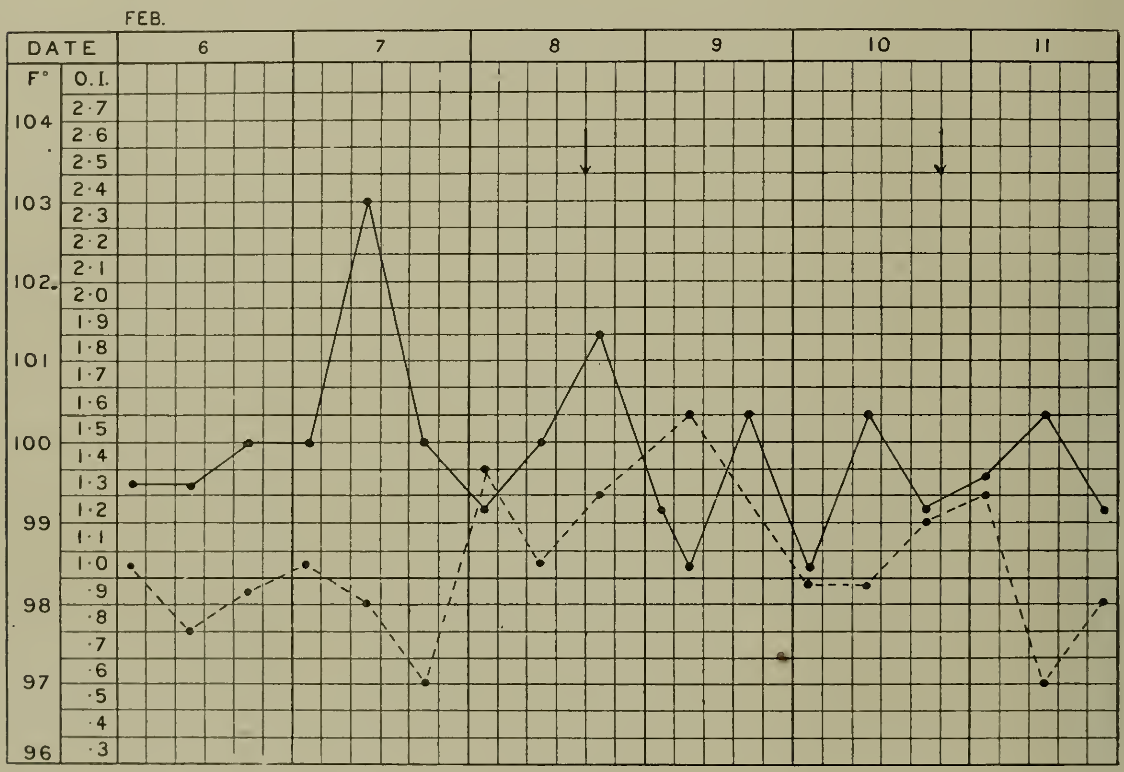


Fig. 26.

Chart showing the relationship of the Rectal Temperature and the Opsonic Index in a case of pulmonary tuberculosis (Dr. Inman).

The index was determined three times a day from unknown bloods. The temperature was taken in the rectum by means of specially certified thermometers and was unknown, except to the nurse, until all the opsonic determinations had been recorded. The same conditions apply to fig. 27.

——— Temperature.
- - - - - - - Opsonic index.

In Afebrile Cases (figs. 29 to 31)—

(1) The opsonic index fluctuates with the temperature, but in an inverse direction.

(2) When the temperature has been fluctuating from 97° F. to 98·4° F., and then remains level at 98° F., the opsonic index rises.

(3) When the temperature, previously level and normal or subnormal, rises to 99° F., the opsonic index falls.

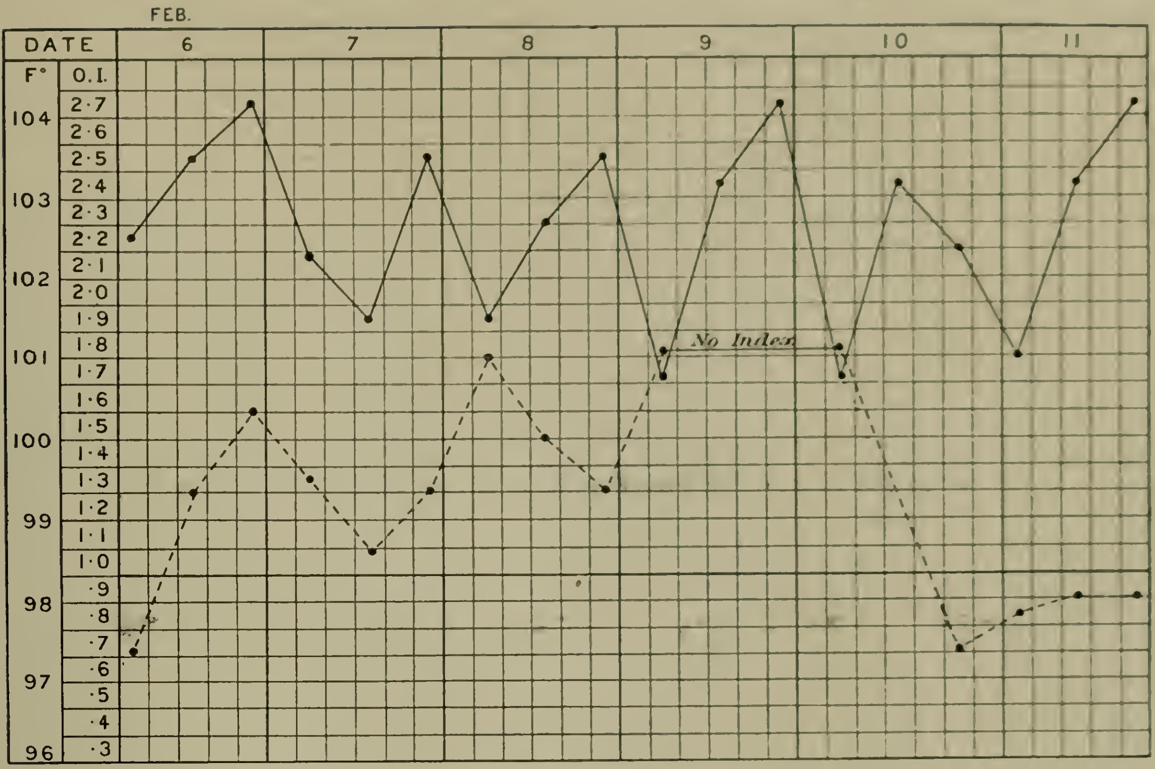


Fig. 27.

Chart showing the relationship of the Rectal Temperature and the Opsonic Index in a case of pulmonary tuberculosis (Dr. Inman).

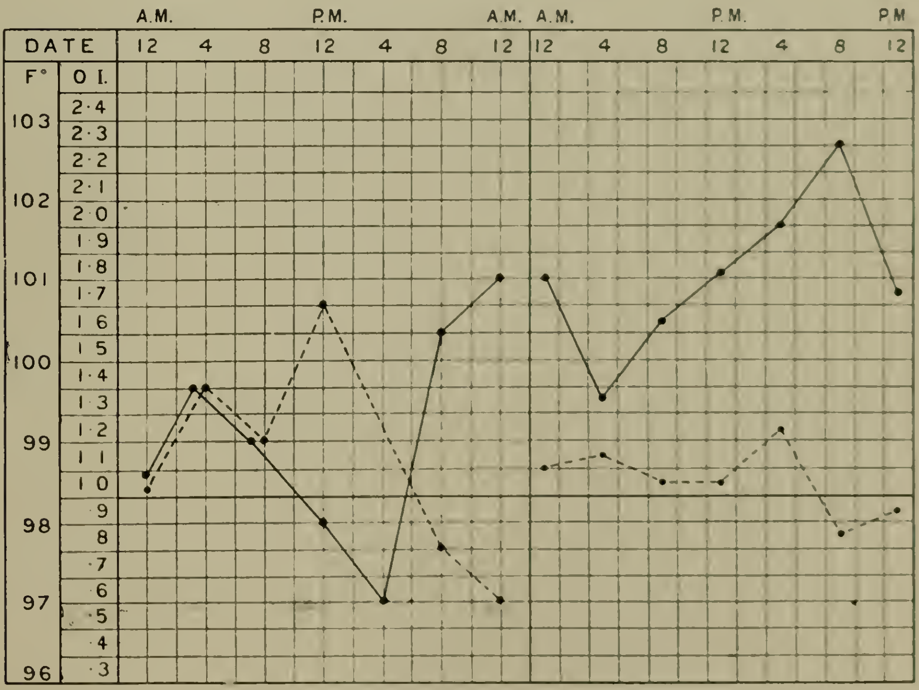


Fig. 28.

Chart showing the relation of the Temperature to the Opsonic Curve in cases of pulmonary tuberculosis, both being observed every four hours for twenty-four hours (Dr. Inman).

——— Temperature.

- - - - - - - Opsonic index.

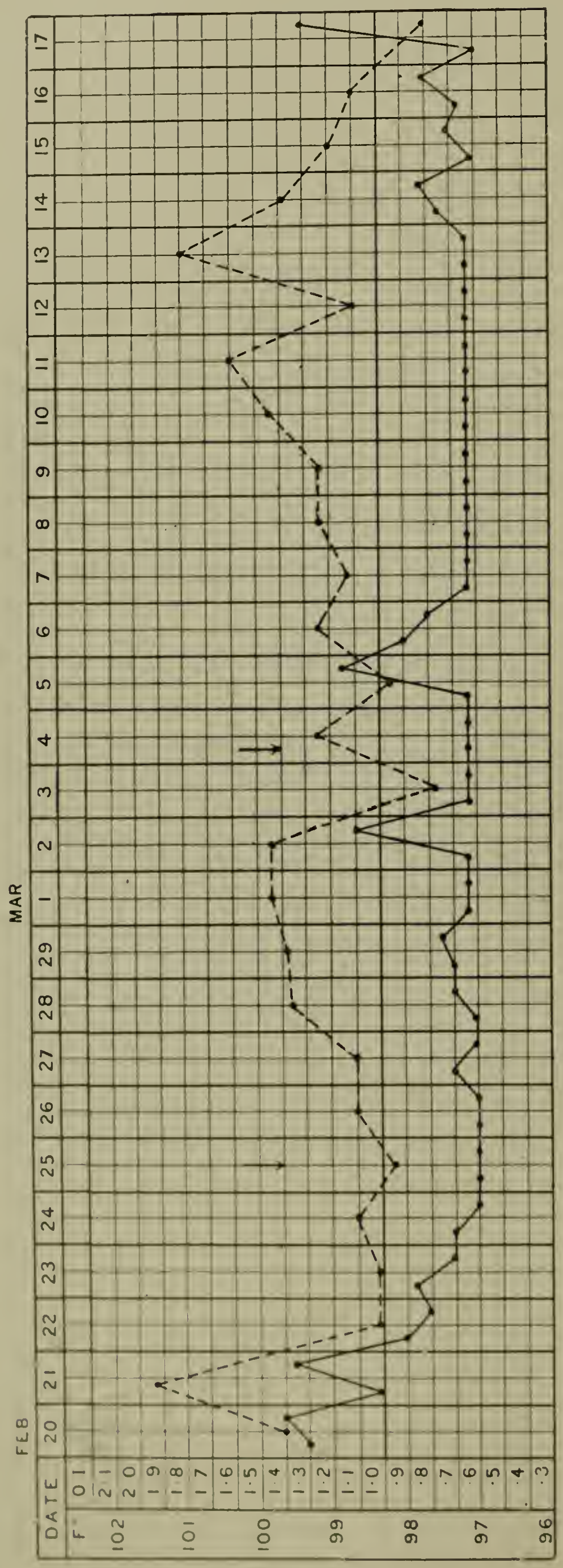


Fig. 29.

Chart showing the relation of the Temperature and Opsonic Index in pulmonary tuberculosis (Dr. Inman).

——— Temperature - - - - - - - Opsonic index.

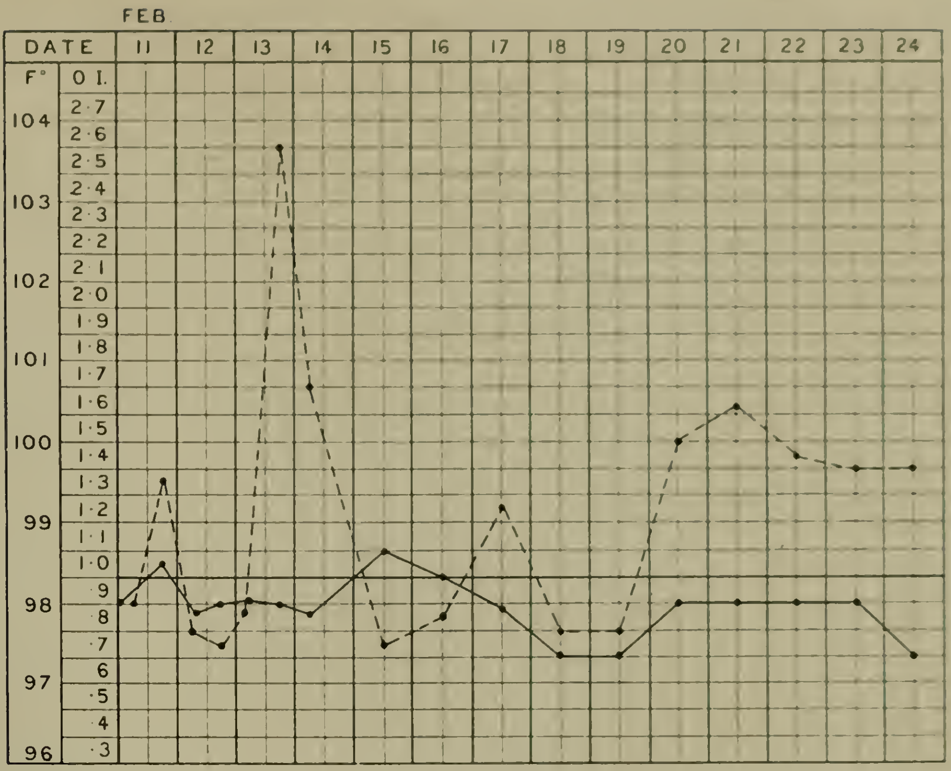


Fig. 30.

Chart showing the relation of the Temperature and Opsonic Index in pulmonary tuberculosis (Dr. Inman).

——— Temperature.
- - - - - - - Opsonic index.

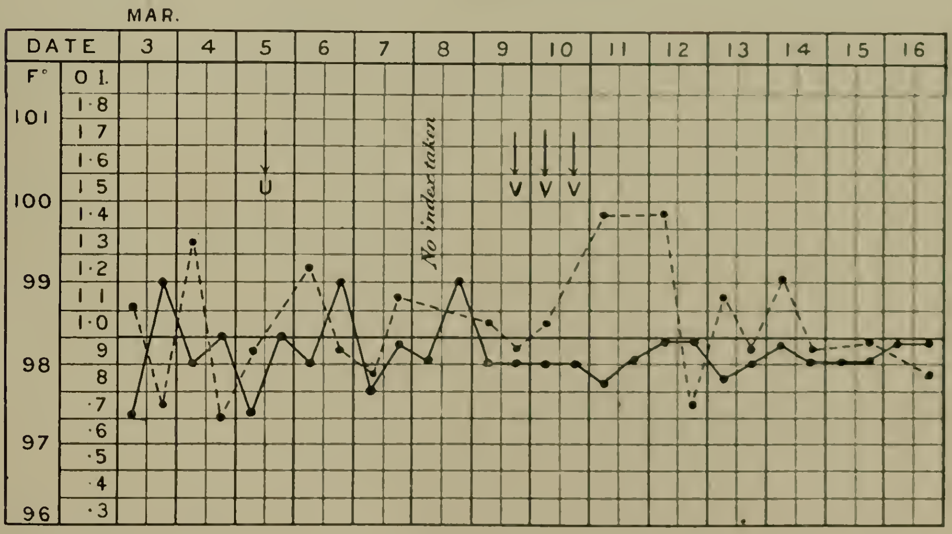


Fig. 31.

Chart showing the relation of the Temperature and Opsonic Index in a case of tuberculous disease of glands (Dr. Spitta).

——— Temperature at 8 a.m. and 6 p.m.
- - - - - - Opsonic index at 10 a.m. and 4 p.m.
(U) $\frac{1}{1000}$ mg. tuberculin in saline, by the mouth.
(V) $\frac{1}{3000}$ mg. tuberculin.

This relation of the opsonic index to the temperature holds good for other diseases.

Dr. B. B. Macdonald has shown that in the febrile period of pneumonia the opsonic curve of the pneumococcus is persistently low, and that at the crisis there is a rise in the opsonic index which may precede the fall in temperature. This relation of temperature to the opsonic curve in pneumococcic infection is well shown by the figure kindly lent me by Dr. J. W. H. Eyre (figs. 32 and 33).

The relation is also shown in a case of coli cystitis. Dr. Inman and I submitted our charts to Sir A. Wright, who then superimposed the opsonic and temperature curves in the accompanying chart (fig. 34), which he has kindly lent us.

To emphasize what appears to be the relation of the opsonic and temperature curves, I would venture to prophesy that in a case of enteric fever—

(1) When the temperature is continuously high the opsonic index is low;

(2) When the temperature becomes remittent and of a lower general level the opsonic index fluctuates more and has a higher general level;

(3) When the temperature approaches the normal the opsonic index rises.

I would go a little further and suggest that the evening rise of temperature, common to healthy people, to 98·4° F. is the result of a decreased opsonic content due to the absorption of various toxins during the day's work, such as possibly those of the *Bacterium coli* or the products of muscular exertion.

Relation of the Opsonic Index to the Clinical Symptoms.

(1) The opsonic index is low when the patient complains of subjective symptoms, headache, restlessness, want of appetite.

(2) The opsonic index is raised when the patient feels better, and his symptoms show improvement.

EFFECTS OF THE ADMINISTRATION OF HORSE SERUM.

That horse serum and other animal serum will find a place in our therapeutic measures is probable, but it is impossible at this stage to speak definitely of the value of horse serum in the treatment of infective

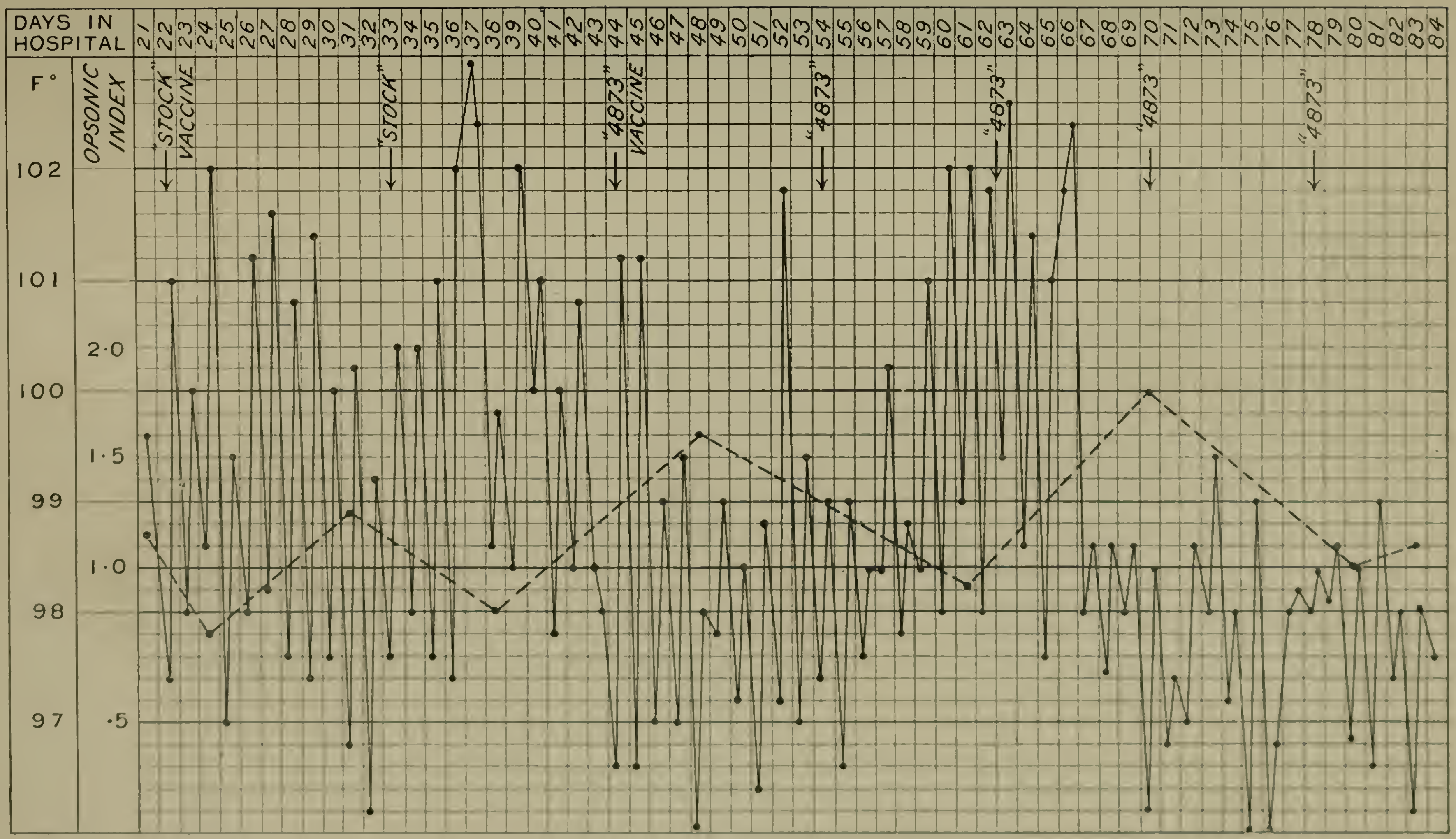


Fig. 32.

Chart (kindly lent by Dr. J. W. H. Eyre) showing the relation of the Temperature to the Opsonic Index in a case of pneumococcic infection of a tuberculous peritoneum. - - - - - Opsonic index.

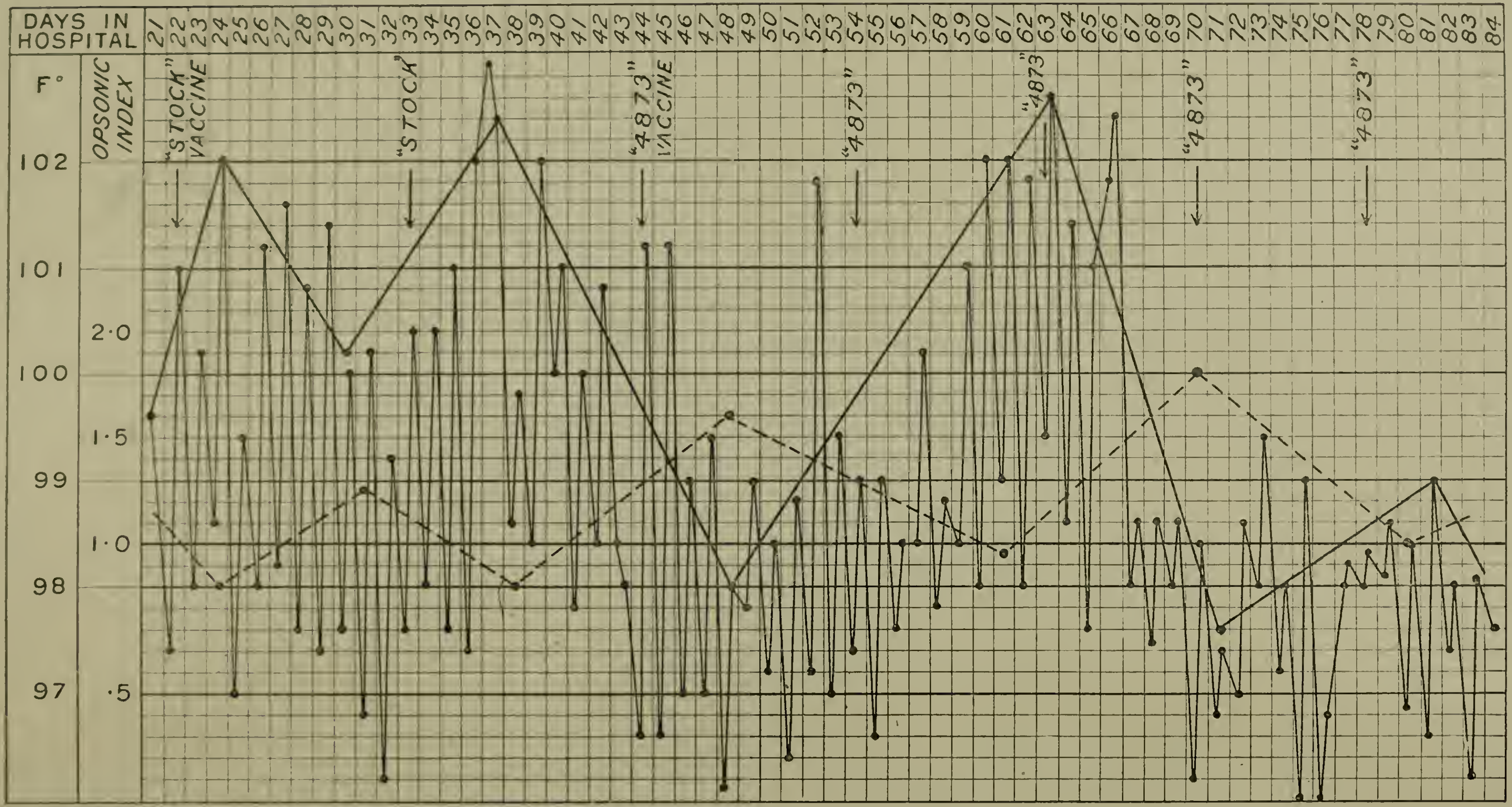


Fig. 33.

The same chart as the last, the relation of the Opsonic Index to the Temperature being made more obvious by drawing a line from the highest to the lowest temperatures.

——— Temperature curve. - - - - - - Opsonic curve.

disease. It will take further investigation to show its value. The control cases in which vaccines and saline solution have been given have given good results; and the tendency has been to use less serum of late. At the same time I would mention that in a few instances tuberculin and serum produced good results when tuberculin in saline solution had failed. Fresh horse serum in doses of 10 c.c. to 20 c.c., administered three hours after food by the mouth, increases the opsonic content of the blood so far as tuberculous infection is concerned (figs. 35 to 37), and probably so far as other bacterial infections are concerned. Serum which is more than a fortnight old, especially if it has been left in contact with the blood-clot, makes many patients feel ill. A general flush appears, especially in the face; the appetite is diminished, the patient may complain of sore throat, and there is often a rise of temperature.

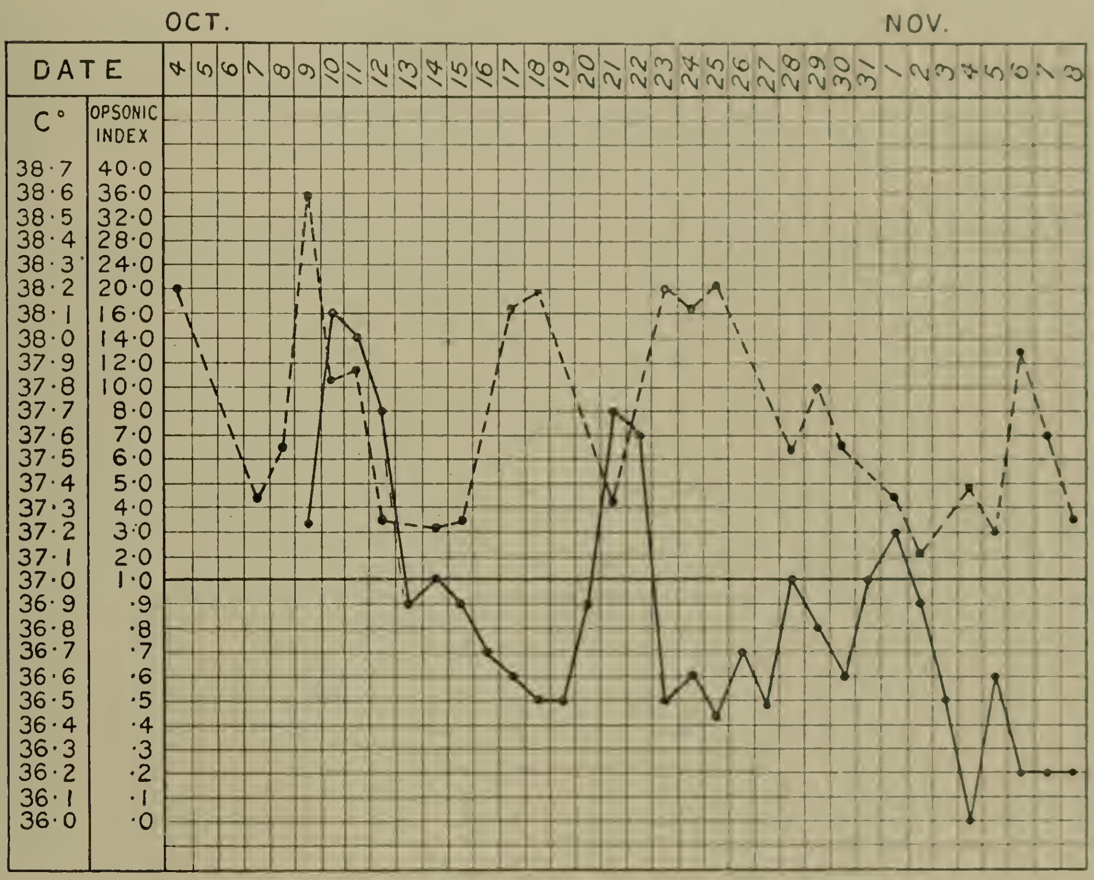


FIG. 34.

Chart (kindly lent by Sir Almroth Wright) showing the relation of the Temperature to the Opsonic Index in a case of cystitis due to *Bacterium coli* infection.

——— Temperature curve.
- - - - - - Opsonic curve to patient's own micro-organism.

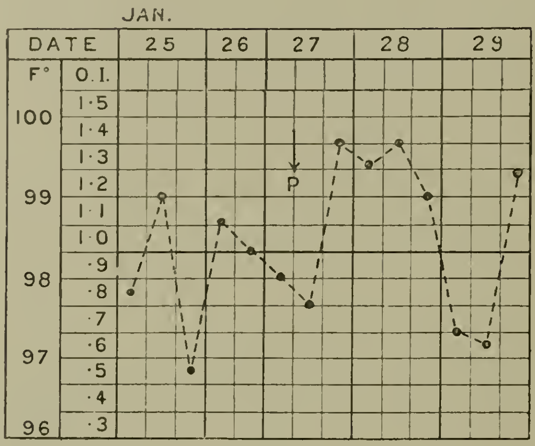


FIG. 35.

Chart showing the effect of the oral administration of fresh Horse Serum on the Tuberculous Opsonic Index in a case of pulmonary tuberculosis (Dr. Inman).

(P) 20 c.c. horse serum.

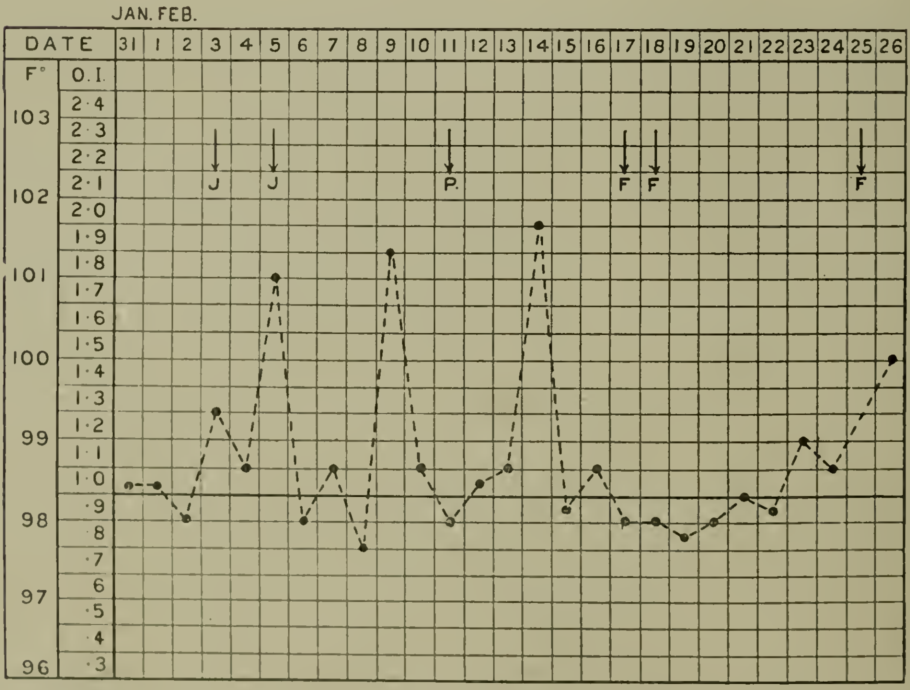


FIG. 36.

Chart showing the effect of the oral administration of fresh Horse Serum on the Tuberculous Opsonic Index in a case of pulmonary tuberculosis (Dr. Inman).

(J) 10 c.c. horse serum.
(P) 20 c.c. horse serum.
(F) 10 c.c. horse serum and $\frac{1}{5000}$ mg. tuberculin.

Sometimes there are marked subjective symptoms, and in one instance the patient sent for the chaplain as she thought she was dying. The administration of old serum in one instance (fig. 37) was followed by a diminution in the opsonic content of the blood. Serum disease—rashes, fever, pains, &c.—rarely follows the administration of plain fresh serum by the mouth. In three instances, however, I have seen serum rashes and fever (101° F. to 102° F., lasting from five to seven days) follow in three days the administration of 10 c.c. of fresh serum, together with 100 millions of stock staphylococci.

I am inclined to think that the administration of serum and tuberculin together produces a shorter negative phase and less disturbance of temperature than the administration of tuberculin in simple saline solution in cases of febrile pulmonary tuberculosis and in cases where there has been much destruction of tissue. This may be due to the fact that the serum increases the opsonic content after a short interval and without producing a negative phase. It should be possible to space the doses of serum and tuberculin in such a way that the negative phase caused by the tuberculin is largely diminished. In

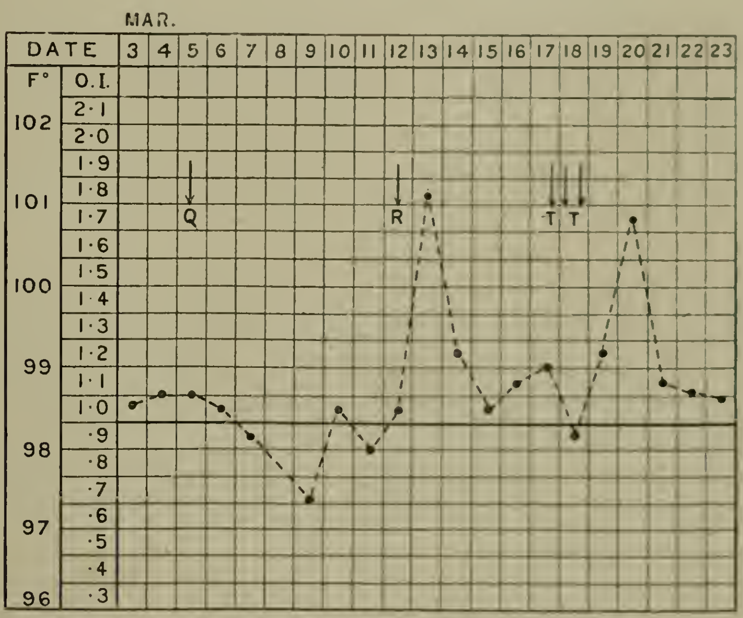


Fig. 37.

Chart showing the effect of the oral administration of Horse Serum upon the Tuberculous Opsonic Index in a case of pulmonary tuberculosis (Dr. Inman).

(Q) 10 c.c. horse serum three weeks old.
(R) 20 c.c. fresh horse serum.
(T) 20 c.c. fresh horse serum at twelve-hourly intervals.

severe cases, prolonged administration of serum is often accompanied by a certain fluctuation of the temperature and a tendency to diarrhœa. I am inclined to think that patients who are treated at first with serum and tuberculin make more rapid progress if, at the end of two weeks or so, tuberculin is administered in saline solution than they do if the serum is continued.

In cases in which serum is administered its repeated use should probably not be continued for a longer period than a fortnight as a rule. It is, however, well to give it occasionally, for example once a fortnight or three weeks, after its continuous use has been discontinued.

There is some evidence to suggest that in other infections (staphylococcic, &c.), where the infection is not limited or the case is of long standing or one in which there has been a number of relapses, the administration of serum is of value. In cases where the lesion, whether tuberculous or other, is well limited and not of long duration, we have had no evidence so far that the administration of serum is of value.

The administration of serum by the mouth probably facilitates the absorption of vaccines in the same way as normal saline solution does.

We intend to carry this investigation as far as we can to a conclusion. My own impression is that the administration of vaccines by the mouth, and the knowledge that we can gauge the changes of the opsonic index by a careful study of the clinical symptoms at the bedside, will encourage the adoption by the profession of the methods of active immunisation which have been rendered possible by the brilliant and fascinating work of Sir Almroth Wright. So far as tuberculous disease is concerned I believe its future treatment will fall under four headings: (1) The limitation of auto-inoculation; (2) the utilisation of auto-inoculation, by carefully graduated exercise and labour, to produce active immunisation; (3) the production of active immunisation by the careful administration of one or other of the preparations of dead tubercle bacilli; (4) the raising of the patient's resistance by proper attention to hygiene and diet.

I would add one word as to the value of the opsonic index. I was at one time very sceptical about the reality of the deductions drawn from observations of this index. Since I have had an opportunity of studying the subject at first hand I have been completely converted. The relation between the temperature and the opsonic index is to my mind a convincing proof of the reality of the index when determined by competent and conscientious observers. The opsonic index may not, in fact does not, give us a complete picture of what is taking place in the blood in infective disease, but it does tell us the immunising capacities of the serum, and is probably a fair guide to the resistance of the body.

In this investigation I have learnt much of the meaning of the clinical symptoms and of the variations of the temperature in tuberculosis and other infective diseases; so that I am now in a position to know what I am doing, where, previously to the knowledge obtained from a study of the index, I had confused and misty ideas. Having acquired this knowledge I feel able to carry on the treatment without opsonic determinations as a rule; but, notwithstanding that, occasions arise in which a determination of the index gives most valuable information.

In conclusion I wish to thank my colleagues for their courtesy in placing cases at my disposal, and my house physicians for much laborious and detailed work.

DISCUSSION.

Dr. F. W. **Forbes-Ross** said the paper was one of the most important which had been contributed to the Society. He had got himself into trouble with the pathological gods of medicine for holding that the flesh of tuberculous cows could be used by the mouth for the purpose of influencing the opsonic index and increasing the resistance of tuberculous patients, bearing in mind the fact that a patient possessed sufficient tubercle bacilli of his own to be able to ignore an occasional bovine bacillus. Some few years ago, in 1890, they had statements from various learned authorities to the effect that horse serum was a preventive of consumption, because horses were found very seldom to be tuberculous subjects. Fresh raw eggs by the mouth, causing "avianisation" of human blood, acted in a similar way. In 1892 he took the serum of several puppies, and simultaneously injected subcutaneously certain patients at the time when cantharidinate of potassium and cacodylate of soda (later) were being used, but not with much advantage. In 1895 he contracted diphtheria from a case he had foolishly sucked, and had an injection of horse serum. He found—and the conclusion was borne out by other cases of diphtheria since—that horse serum would produce very severe and intractable urticaria. It was not strange that the sera of animals should have a vast influence upon the blood of the person injected. In some it caused so much disturbance as to lead to extensive serous hæmorrhages. At about the same time psoriasis was being treated by mouth with thyroid extract successfully. This clearly proved to his satisfaction that the blood could be influenced through the stomach. With regard to temperature reactions, he (Dr. Forbes-Ross) had published in the

New York Medical Journal, November 9, 1907, particulars of some identical clinical reactions to which he wished to draw Dr. Latham's attention. The last point he wished to make was, in his opinion, one on which the utmost stress ought to be laid. He had had some practical experience with pulmonary surgery done by himself during the fifteen years and more that he had been a member of the profession. From the experience he had gained with regard to the administration of tuberculin as against the use of raw ox meat, bearing in mind the work of other investigators, Kingston Fowler (sites of tubercle foci in the lungs) Héricourt, Richet, Dvorak, Parkes Weber, and Godlee's unique work as a lung surgeon, they must be careful in using some of these tuberculin preparations lest they form a very marked and rapidly increasing vomica of the lungs. He had known cases in which a very enormous cavity developed in a previously consolidated lung under such conditions within three months of the administration of tuberculin. Indeed, he believed that he could produce vomication of the lung at will. This was the great point to which he wished to direct the attention of so able a worker as Dr. Latham—the danger of bringing about well-marked conditions of vomication very rapidly by too large or too frequent doses of dead bacilli, which was, however, one way of Nature's attempt at cure, and then arose the need for further procedure in aid, which he would not then discuss.

[The meeting was adjourned until May 26, when the discussion on Dr. Latham's paper will be resumed.]

Medical Section.

May 26, 1908.

Dr. SAMUEL GEE, President of the Section, in the Chair.

Discussion on Dr. Latham's paper on "The Administration of Tuberculin and Other Vaccines by the Mouth, together with (*a*) Normal Saline Solution; (*b*) Fresh Horse Serum."[1]

Dr. E. C. HORT said that as he had been engaged for twelve months in attempting to answer the questions raised by Dr. Latham's able paper, he was naturally much interested in this discussion. He ventured, therefore, to contribute to it by referring briefly to his own work on the subject, which to some extent confirmed the results arrived at by Dr. Latham, whose investigations, though commenced at a somewhat more recent date than his own, formed an absolutely original and independent inquiry. As regards the internal administrations of normal horse serum, he had in the last fourteen months been directly responsible for the administration of more than 50,000 c.c. in over 150 cases of different diseases, details of which would shortly be published. His experience was as follows: (1) Its action, when given internally, was more restricted than when applied locally. Its mode of action in the former could only be indicated at present by its more easily observed action in the latter. In this it seemed to combine a stimulin action with the paralysing influence that it could be demonstrated both *in vivo* and *in vitro* to exert on autolytic and heterolytic enzymes. (2) It might be given by the mouth for weeks in daily doses of

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[1] Read at the meeting on March 24.

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30 c.c. to 40 c.c. with impunity, but it must be fresh and sterile, and should be given directly after food, when absorption was at its height. If these conditions were observed the collapse, serum rash, pyrexia, and other by-effects noted in Dr. Latham's paper would not appear. (3) In such generally infective conditions as pulmonary tuberculosis and pneumonia it was apparently of little value. Dr. Latham's suggestion of giving it with tuberculin might prove to be of benefit, but of this he had had little experience. (4) In many cases of so-called simple anæmia a rapid rise of hæmoglobin and corpuscular content followed its internal administration, though in pernicious anæmia it was useless. (5) In hæmoptysis, purpura, hæmophilia, the hæmorrhage of typhoid ulceration, it was often of very material benefit. (6) In such conditions as chronic gastric and duodenal ulcer, ulcerative colitis, extensive varicose ulcer, obstinate bursæ, &c., it was, with few exceptions, of high value. (7) When applied locally in the form of constant dressings in such chronic conditions as surgical tuberculosis and staphylococcal infections it gave excellent results. In cases of mixed infection of these two organisms he had found it good practice to attack the staphylococcal infection first by administering the appropriate vaccine by the mouth. It might appear that the action of normal horse serum on conditions not obviously bacterial was outside the scope of a discussion on immunity; but one of the many functions of the serum of an individual and of his cells seemed to be the restraint exerted on the autolytic action of his own enzymes. In many lesions, as, for example, in all kinds of ulceration not primarily dependent on bacteria, the phenomena of ulceration might be due to an absence of such restraint, in other words, to a breakdown in the mechanism of immunity against such enzymes. It was beyond dispute that the normal serum of many animals, including man, and notably of the horse, had strong antitryptic and anti-autolytic power. By administering serum, as in the cases referred to, they were, of course, transferring this protective body to the seat of cell destruction; the clinical effects were significant and might explain many hitherto unexplained diseases, of which non-bacterial ulcerations of all kinds seemed to be a good example. In bacterial lesions the effect of the serum appeared to be, amongst other things, stimulation to repair and inhibition of bacterial proteolysis. This antitryptic power of serum was becoming well known. The work of Hedin, Baer, and later Koltschmann and Müller, showed that the anti-enzyme was tied to the albumin fraction. It appeared from the work of Dr. Golla that its inhibitory power underwent variation in different diseases. The satisfactory results he had obtained with normal serum in many forms of proteolytic cell destruction had led him to attempt to get a serum prepared with this antitryptic power increased. In this he owed much to the work of Dr. Martin at the Lister Institute, and to Dr. Golla, who informed him that serum so prepared had a high antilytic valency. It might be prepared in two ways, either by subtracting from serum the globulin moiety, which favoured proteolysis, or by increasing the relative amount of albumin present. Such had now been prepared, and the

difficult problem of at the same time preserving the stimulins had also been apparently solved. The serum stripped of its globulin he had labelled antilytic serum A; the serum in which albumin content had been increased and in which the globulins had been left intact with the stimulins and other antibacterial bodies he had designated antilytic serum B. The first was for internal use, the second for local. As regards the oral use of tuberculin and other vaccines by the mouth, he had only the evidence of some twenty recent cases, mainly of staphylococcal infection, to offer. These included cases of pustular eczema, suppurating sinuses and infected ulcers of tongue and mouth, and a few of surgical tuberculosis. He had treated most by vaccines by the mouth and serum locally. His limited experience indicated that when used in this way they appeared to be useful.

Dr. HECTOR MACKENZIE desired to congratulate his colleague on his excellent paper, or, rather, two or three papers combined. There was so much in it that, in the short time at one's disposal, it was very difficult to adequately criticize it. He had taken a great personal interest in the subject, as quite early in Dr. Latham's investigations that gentleman told him what he was doing, and asked to have some of his beds at Brompton Hospital at his disposal for observation and experiment. He (Dr. Mackenzie) had seen those cases constantly, and at the same time he had been doing something in the same direction, though on somewhat different lines. In regard to staphylococcic infections he was quite satisfied that in vaccine treatment by the mouth one had a powerful remedy. He had seen most remarkable results from it in cases of long-standing acne which he had treated, the vaccine used coming from the Lister Institute. He had given it with normal saline in doses of 2 c.c. at intervals of three or four days, being guided by the condition of the patient and the appearance of the eruption. In no case had he troubled to ascertain the opsonic index, and in no case had he seen anything but a gratifying result. With regard to the results from tuberculin vaccine, he was still in doubt. He had seen and studied the very interesting charts which Dr. Latham had exhibited, and he had in mind similar charts which he could have brought forward to prove the efficacy of other methods of treatment. He had shown similar results from putting the patients under open-air conditions: where a patient had been for several weeks under observation, with fever resulting from tuberculosis, there was always a danger, when watching the effects of a new remedy, of attributing any improvement which ensued to the treatment when it was only part of the natural course of the disease. Many cases of tuberculous peritonitis and tuberculous pleurisy were found to get well under almost any conditions, although, of course, many cases were met with in which the opposite was the case. Unless there were details of many cases treated by the method, it was impossible rightly to estimate its value, and premature conclusions concerning it should be carefully guarded against. He asked Dr. Latham when he started on the treatment at Brompton if he would select from his wards cases which had been for a considerable time in hospital with fever and had not previously been making satisfactory progress; and he very kindly took several of those cases in hand, but he did not think that favourable results were observed in those cases. Those which had not done well before the vaccine treatment was started did not do well under it; at least that was his impression, and Dr. Latham would correct him if he was wrong. He had had at St. Thomas's Hospital during the last nine months a case of acute pneumonic pulmonary tuberculosis in which steady improvement had been noted month by month. In that case, in January last, he started tuberculin by the mouth in what seemed, in the light of Dr. Latham's paper, to be somewhat heroic doses, namely, tuberculin (T.R.) in saline solution in doses of $\frac{1}{5000}$ mg. three times daily. He had also treated, at Brompton Hospital, cases of tuberculous glands, giving tuberculin three times a day by the mouth, without regarding the opsonic index, and he had been astonished at the slight constitutional effect it produced on the patients, beyond making them feel better and improving their appetites. In several cases of tuberculosis in the neck he was gratified by the results; the glands softened and got smaller or subsided, and he did not doubt that tuberculin by the mouth was a very useful remedy for tuberculous glands; but he thought a good deal of work would yet have to be done before we could properly understand the effect of tuberculin in pulmonary tuberculosis. So far he had not been much impressed with the results, either in Dr. Latham's cases or his own. Dr. Latham had stated what the effect on the opsonic index was in some of the cases. In the case of which he was about to show the chart he had the opsonic index taken on only three occasions. It was first taken after the tuberculin had been given for a fortnight, and the report was that the tuberculin opsonic index was no less than 3·7. In a fairly large experience of opsonic indices in tuberculosis he had never heard of one so high. Afterwards, while the patient was continuing the tuberculin treatment, the opsonic index was 0·7 and 0·9. The temperature when the patient was first admitted showed a high range with considerable fluctuations. General improvement had taken place during the first six months, when the patient was having simple open-air treatment on the balcony. The temperature still showed evening rises at the end of January, when the new treatment was started. After giving the tuberculin there was, for the first time, a temperature which did not mount above the normal for three successive days. He was encouraged by this, and the mixture was persisted in three times a day for twenty-five days, the dose being increased first to 0·0003 mg. and then to 0·0004 mg. The temperature, however, after the first four days, showed the same irregularity as before. After a week's interval tuberculin was given again for fourteen days in doses of 0·002 mg. three times a day; then for three weeks he gave it for four consecutive days; then a break of three days, and so on; then he gave it in doses of 0·0006 mg. every morning. On April 15 the administration of tuberculin was stopped. The patient had had tuberculin over a period of nearly three months, with occasional intervals, the total amount given being 0·05 mg. Since tuberculin was stopped the temperature had shown further improvement. He thought that the general results were encouraging, although inconclusive, and that with further trial one might learn what was the best time to give the tuberculin, and what was the most suitable dose. Dr. Latham's observations as to the relationship between the opsonic index and the temperature were certainly of very great value. He (Dr. Mackenzie) had always felt that if the treatment of tuberculosis was to depend on the ascertainment of the opsonic index, the therapeutics of the disease must come to a standstill, because it was impossible to regulate the treatment of any great number of cases of this disease by such complicated and difficult observations as those connected with the opsonic index.

Dr. A. G. AULD said he had read Dr. Latham's paper, and he agreed with Dr. Hector Mackenzie that the cases brought forward therein were far too few to form definite conclusions upon, so as to constitute a guide to the general practitioner. All the cases mentioned, except one, had been out and about before their admission to hospital, and immediately they were admitted to hospital they began to improve. It was a question how far the subsequent improvement was due to the hospital treatment—such as rest and good feeding—and how far to the administration of horse serum with tuberculin. It was remarkable how cases of staphylococcus infection improved when the patient was given a few dead staphylococci with his food; it seemed almost incredible that such a disease should be cured by the simple ingestion of a few dead bacilli with the bread and butter, but apparently it was the fact. He desired to make a remark on the pneumococcus cases. One of such cases quoted by Dr. Latham was that of an infant aged 2; the other, an adult man aged 35, who, apparently, was suffering from an attack of acute pneumonia in his left lung. At the sixtieth hour of his disease that man was given a dose of stock pneumococci, with horse serum, by the mouth. At that time the temperature was oscillating between 103° F. and 104° F. In eight hours the temperature fell, accompanied with profuse perspiration, and continued to fall until, on the fifth day, it reached the normal. A week later the patient had a patch of consolidation in the opposite lung, and the temperature again rose to 102° F. Subsequently an empyema developed on the left side, *i.e.*, the side of the original disease, and drainage was required. If that dose of pneumococci had not been given on the third day the question was: Would the empyema have developed in that lung? He believed it would not, because at the sixtieth hour of the disease, when the temperature was 104° F., it looked like "trumping one's partner" to interfere with it. Such a temperature was a good card to play, and, moreover, a necessary one. Nature was already acting well, and he thought the measures which upset the normal reaction were responsible for the development of the empyema. Still, Dr. Latham might have other cases which justified the treatment. With regard to horse serum, when he, Dr. Auld, was working at the Embankment Laboratories, effects from horse serum were noticed somewhat similar to those mentioned during the present debate, but at that time no public notice was taken of the matter. As to the rash which sometimes appeared after its administration, it might be an awkward matter for the practitioner, and therefore, if some method could be found which would obviate that, it would be a good thing. He asked at what stage in the disease Dr. Latham thought it best to give the vaccine. If it came to be a matter, as Dr. Mackenzie said, of giving it three times a day with food, was it simply necessary to put "t.d.s." on the prescription? That scarcely seemed a scientific way of proceeding, and he would like to know at what average temperature a dose should be given.

Dr. H. D. ROLLESTON said a note of warning had been sounded, and he thought members should appreciate that the method was a new one and that caution should be exercised in regard to it. At the same time he could not help feeling, both from what he had seen at St. George's Hospital and from what he had read in Dr. Hort's papers, that there was a very great future for the serum. He had had an opportunity of watching the case of pneumonic tuberculosis to which Dr. Latham had referred, and there was no doubt in his mind that improvement dated from the time the patient had received vaccines by the mouth and that the initial progress had been very unfavourable. He had no further experience of the oral administration of vaccines. In another, but not nearly so severe a case of pulmonary tuberculosis with a continuously raised temperature, improvement followed the oral administration of horse serum, the temperature becoming normal. Since Dr. Hort's papers had appeared, Dr. Rolleston had given horse serum alone by the mouth in a number of conditions —mainly gastric ulcer—and with considerable benefit, especially in the relief of pain. He had seen good results in hæmorrhage and in purpura. The anti-autolytic action of horse serum when locally applied to ulcers had suggested its use in the troublesome condition of herpetic stomatitis, which had such a tendency to recur in women, and as a rule only improved with amelioration in the general health of the patient. He had seen good results follow the local application of horse serum by means of a camel-hair brush to the ulcerated spots. At present the use of horse serum had been shown to be valuable by the results obtained, and it appeared probable that there was a great future before it, but it was important that its employment should be safeguarded by a knowledge of the antibodies contained in any given sample of the serum that was to be employed. Thus, if serum was to be given to heal a gastric ulcer it should be proved to have anti-autolytic powers, as shown by its ability to induce healing of an ulcer artificially produced in animals by means of a gastrotoxic serum; or, if given to prevent hæmorrhage, the brand used should be known to contain antihæmorrhagins.

Dr. H. J. JOHNSTON-LAVIS said there was a treatment for tabes mesenterica which he used twenty-five years ago, namely, raw meat-juice, and the present paper stimulated speculation as to the way that juice probably acted. He would like to suggest research on the reason why raw meat-juice did act beneficially on tabes mesenterica. One suggestion which occurred to him was that the meat-juice was nearly allied to the serum, or that it contained certain antibodies, or that, without knowing it, in those early days, treatment by tuberculin was carried out. Possibly, in the accidental selection of meat, the flesh of tuberculous animals might have been utilized, and attenuated doses of tuberculin might have been given, or degenerate tubercle bacilli. In the last four or five years, in France, horse serum and bovine serum had been sent out commercially, and two years ago he tried that serum, which was recommended to be given either by the mouth or by the rectum. The first few doses seemed to do good, but eventually the patient was not much the worse for it, and not much better—he was referring specially to pulmonary tuberculosis. As there seemed to be no very striking result the treatment was probably dropped, without inquiring why. For some years since the hæmostatic value of gelatine had been demonstrated he had fed his patients with gastric and even intestinal ulcer almost entirely on gelatine; it was made into nice palatable jellies. Last year he had a case of terrible hæmorrhage from the stomach in a woman, who was now perfectly well, and whose diet for six weeks consisted almost solely of gelatine. Possibly there was a special hæmostatic substance in the serum, as in the gelatine; or was there some action of the serum differing from that in the gelatine? He had not the time, in a busy practice, for investigating those problems, but he thought it worth while to mention the speculations and suggestion for research he had indulged in.

Dr. VERE PEARSON said that six months ago Dr. Latham suggested that he should try the method on some cases at Mundesley Sanatorium, and he had so treated several cases during that time. It was premature to express any opinions, but he might state his impressions. He had, in the past, been biased against the use of tuberculin for lung tuberculosis, largely because he had observed instances of that potency for evil of this remedy, if wrongly used, to which Dr. Latham had referred. For some years he had lived among consumptives, and though he, personally, had given very little tuberculin to cases with pulmonary tuberculosis, he had seen tuberculin given by the old method cause more harm than good to such patients, chiefly amongst those treated on the Continent. At present he felt his bias against it yielding and giving place to a feeling of trust in it when given under suitable circumstances. He had only treated eight cases by the new method. Three of the cases were suffering from genito-urinary tuberculosis, and he gave tuberculin by the mouth instead of injecting it. One was an uncomplicated case; the other two had pulmonary tuberculosis in addition. The lungs of the last two were in a satisfactory state. The first case he had had under his care for nearly twelve months, and for several months he had given tuberculin by injection, but no permanent progress seemed to be made. Since March the patient had had it by the mouth, and the progress had been much better, so that the patient was now fairly well. He had had twenty doses, eight of them with horse serum. The second patient, after having had the first few doses, said he did not know what he had been given, but he felt much better after it. The third case had been under treatment only during the last two months. Previously she had had a great deal of pain in the right kidney region, and tubercle bacilli were frequently found on examination of the urine. Now, although there was still some pus and a few bacilli, she said she was much freer from pain. Another case was one of spinal caries, which had only been treated recently. Since she had been having tuberculin by the mouth she had been much freer from pain, from which she had suffered much. One of the original cases in which he tried the remedy was one of advanced pulmonary tuberculosis—disease in both lungs, with large cavities on one side, and subject to hæmorrhages. The patient had been under strict sanatorium treatment for years, and did not seem at all hopeful. He gave him horse serum originally, as he was told it would benefit hæmoptysis. The patient had had a good many doses of horse serum, but never any tuberculin, and he certainly seemed to have been influenced favourably; he had lost all his fever—which he had had, to his knowledge, eight or nine months—and he was walking about. How far the improvement could be ascribed to the horse serum he could not say. In another case of hæmoptysis it seemed to do no good at all; the man had a rather severe hæmorrhage within twelve hours of one of the doses of horse serum. In another case of failure with tuberculin by the mouth it was scarcely a fair case to try. It was one of acute caseating pulmonary tuberculosis, combined with much intra-abdominal tuberculosis, enteritis, adenitis, and peritonitis, a rather hopeless case altogether. The patient was a boy aged 17. He had very high fever. He had tried two or three very small doses of tuberculin and two doses of horse serum, and they did not seem to have any influence either way. He feared the boy was now dying of generalized tuberculosis. The last case he would mention was one that, as far as the physical signs went, had very slight pulmonary tuberculosis, but he had had over six months of constant fever, slight but persistent. He kept him in bed in the open air as much as possible, tried all the remedies usual in such a case, and then, at Dr. Latham's suggestion, started him with tuberculin and horse serum. Within three weeks his temperature dropped, and his pulse-rate decreased also, in the first week, from 80 to 68. As a result of his experience with the method he now felt much more inclined to use the method than formerly for tubecurlosis of the lungs, and in future when he had surgical tuberculosis he would give it by the mouth in preference to injecting it.

Mr. STUART-LOW said that he thought that he would not be contradicted when he claimed to have been the first to employ fresh animal blood-serum locally in the treatment of wounds. He had first used it at the Central Nose, Throat and Ear Hospital as a dressing in the radical mastoid operation in a series of cases of chronic suppuration of the middle ear. This was two years ago, and on May 4, 1907, in the *Lancet*, he had published a preliminary account of his results. This horse serum was supplied by Messrs. Burroughs Wellcome and Co., except in his earlier series of cases, in which he had used serum obtained from the butcher, when the serum of lambs and sheep was employed. He now made use of fresh horse serum in a routine way in mastoid operations. The results had been very good and gratifying to the surgeon and the patient, as in this way the average time that the patients were detained in the hospital had been shortened to six days; with horse serum as a dressing the most fœtid and septic cases could have a thorough and extensive operation performed and the risks of dangerous sequelæ, such as septic meningitis, could be minimized. His practical experience with horse serum led him to believe that there was a great future for it in surgery, and particularly in ear surgery.

Dr. R. H. HODGSON asked whether, when a patient with tuberculosis who had been subjected to the particular treatment took exercise and had increased temperature after it, that indicated the activity of the remaining tubercle bacilli. Also if, when a patient subjected to the treatment had exercise without raising his temperature, that indicated that the bacilli were destroyed or that they were rendered latent.

Dr. LATHAM, in replying on the discussion, thanked members of the Section for the reception they had accorded to his paper, though one or two of the speakers had apparently lost sight of the fact that the communication was a preliminary one—a point which he emphasized at the commencement—and that it was not put forward as conclusive evidence of the value of the various remedies described. He had been much interested in Dr. Hort's remarks, but only one point in them seemed to call for an answer from him, namely, the possibility of obviating serum rashes by giving the serum directly after meals. He believed that all observers who had had experience with serum found that a rash was much less frequently produced when the serum was given by the rectum or by the mouth than when it was injected under the skin. He had stated in the paper that the only cases in which a definite serum rash was caused were those in which the serum was given together with staphylococci. There were three cases in which that rash occurred. In regard to giving it with the food he could not offer an opinion, but he thought it probable that better absorption took place when it was given on an empty stomach. If vaccines were given thrice daily with food very little good would be done, because it had been conclusively proved that animals could be immunized by the oral administration of an emulsion of dead bacilli, provided those bacilli were given on an empty stomach; whereas if the emulsion were given with food no immunity resulted. He was also much interested in Dr. Hector Mackenzie's remarks, which confirmed his statement that certain vaccines had a very definite effect when given by the mouth. Dr. Mackenzie rather suggested that he (Dr. Latham) was taking a too optimistic view of the results obtained in the few cases of advanced pulmonary tuberculosis which he had treated. It was perfectly true that in the majority of cases which were under Dr. Mackenzie's care at the Brompton Hospital good results were not obtained. But they were hopeless cases, and it would have been an absolute miracle if striking results had been obtained. One was that of a girl who had been in the hospital eighteen months, with an evening temperature of 101° F. to 102° F., with five lobes affected and with tuberculous enteritis. But in some of the other cases at the Brompton Hospital—some of which were in Dr. Mackenzie's wards—there could be no question about the improvement following the administration of tuberculin. With regard to the cases of pulmonary tuberculosis at St. George's Hospital, he selected five cases which, in his opinion, were certain to do badly, and all those cases had done well. He might have been wrong in his prognosis in regard to one or two of them, but he was not likely to have been wrong in regard to all of them. To take the first case he showed, that of a man who had been kept at rest in bed five months, with an evening temperature which was usually as high as 101° F. to 102° F. without improvement. He was given $\frac{1}{2000}$ tuberculin with 10 c.c. of horse serum and the temperature went down for three days, and that was the first time it had done so in five months. He abstained from giving more, and the temperature went up again He gave a second dose, and the temperature came down again and then rose once more. He then gave tuberculin and serum on two successive days and the temperature came down to normal and remained there. After giving the remedy for three weeks there was an absolutely different clinical picture. That case was surely extremely suggestive of the value of the treatment, for the result followed almost mathematically, though he allowed it was an exceptional case. Dr. Rolleston's case was one of caseating tuberculosis, with an inverse type of temperature, and he had never seen a man so severely ill recover where there was an inverse type of temperature. The records of such cases at the Brompton Hospital showed that they nearly all ended fatally. Of thirty cases of the kind collected by Dr. Kingston Fowler, his recollection was that twenty-eight patients died in a short time in the hospital or soon after leaving the hospital, and in the two cases in which real improvement took place the inverse type of temperature was observed on less than ten occasions. As was to be expected, many cases of pulmonary tuberculosis did not show much, if any, improvement with the treatment, and he thought cases would always be found in which the tuberculin would be of little value—cases in which the disease had been present for a long time, or in which auto-inoculation was being reinforced constantly by the cough. He was confident from his experience, which had been supplemented during the past two months, that tuberculin was of value in many cases of pulmonary tuberculosis. Treatment of pulmonary tuberculosis with tuberculin was no new thing; it had been shown, not so much in England as in Germany and America, that tuberculin was of great value in pulmonary tuberculosis when given properly and in the correct doses. Dr. Auld had reinforced the statement that the number of cases brought forward was too small to found anything on, but he invited him to remember that the communication was a preliminary one, and to give the treatment a trial. The statement by Dr. Auld that the empyema which subsequently developed in one case of pneumonia was due to his (Dr. Latham's) treatment was a strong statement coming from a man who did not see the patient. His own opinion was based upon what he saw. The man was severely ill, and he thought he would have had a very hard fight for his life without the vaccine. He had a hard fight as it was, and he developed what a number of patients suffering from pneumonia were apt to develop, an empyema, of which he rapidly got well. Yet, in spite of the severity of the disease, delirium was very slight after a dose of the vaccine. The same thing happened in other cases treated with pneumococcic vaccines, and in three there was no delirium at all. Boellke observed thirty cases of pneumonia in which he injected dead pneumococci subcutaneously with very encouraging results. The subject was new and he could not dogmatize on it, but it was well worth following up. Dr. Johnston-Lavis had asked whether raw meat-juice acted by means of serum or by means of bacilli. He could not give an answer to that, beyond suggesting that it probably acted in the same way as the serum did. He had been particularly interested in Dr. Vere Pearson's statement about his patients at the Mundesley Sanatorium, because he had seen one case at a sanatorium where a man had not done well under ordinary treatment, and was not able to take any exercise without a return of fever. He had been at the sanatorium three or four months, and had always had to return to bed after exercise was permitted. Tuberculin and serum were given for three or four weeks, with the result that he was able to take exercise without any rise of temperature following. He did not know that he could answer Dr. Hodgson's question as to the relationship between exercise and temperature better than by saying that exertion would cause a temperature if it produced undue auto-inoculation, and that one could treat those patients by exercise, and gradually use their own auto-inoculations to produce immunity; and there came a time when even severe exercise did not elevate the temperature. That brought him to another point to which reference had been made, namely, the necessity or the reverse of controlling the dosage of tuberculin in pulmonary tuberculosis by means of the determination of the opsonic index. He did not agree with those who held that the opsonic index was of little value. He agreed with Dr. Mackenzie that its frequent use was impracticable under ordinary conditions; for example, in acute pulmonary tuberculosis the index fluctuated so freely that the opsonic index could not be relied upon unless three or four determinations were made daily. At the same time he held that the opsonic index enabled them to learn the meaning of the clinical symptoms, and that when the meaning of the symptoms had been learnt it was possible to regulate the dosage of tuberculin by clinical observation. His view of the practical value of the opsonic index might be well illustrated by a parallelism. In learning a new language it was usually necessary to employ a tutor. The index might be likened to a tutor, who interpreted and made clear the language of the temperature and clinical symptoms in disease When a language had been learnt the services of a tutor could be dispensed with, as a rule; but occasions arose, such as when a difficult passage was encountered or some uncommon use of a word occurred, when it was necessary for the tutor to be again consulted. When the meaning of the clinical symptoms had been learnt by means of the opsonic index the index could be dispensed with, as a rule; but occasions arose, such as the decision whether a rise in temperature depended upon the disease or upon some extraneous circumstance, when it was necessary for the index to be determined.

Dr. Inman had demonstrated that the immunity produced in chronic pulmonary tuberculosis by sanatorium treatment, whether as the result of regulated exercise on the lines laid down by Brehmer and Otto Walther, or of Dr. Paterson's system of graduated labour, depended upon the judicious use of the patient's own tuberculin. Years of experience had shown that the clinical symptoms and temperature were a sufficient guide to the amount of auto-inoculation (in other words the amount of exercise) that should be prescribed. He (Dr. Latham) thought it was self-evident that the guide which had proved of so much service in determining the dose of the patient's own tuberculin could be relied upon, in the vast majority of instances, to determine the dose of Koch's tuberculin which would best meet the requirements of an individual case.

Medical Section.

June 23, 1908.

Dr. D. B. Lees in the Chair.

The Tone of Cardiac Muscle.

By A. M. Gossage, M.D.

Some two years ago the writer [5] made certain suggestions as to the rôle played by the tonicity of the cardiac muscle fibres in the maintenance of the circulation in health and disease, and subsequently developed this suggestion in a paper read before the Royal Medical and Chirurgical Society [6]. The anatomy and physiology of the heart have both been enriched by several new facts during the past two years, so that no apology is needed for reviewing the subject. Porter's [18] researches, too, into the subject of muscle tone had already shown him, in 1902, that the individual beats of a tortoise's auricle get smaller with increased tone, and that increase of tone directly diminishes conductivity. Porter's experiments have the advantage that the variations of tone were produced independently of drugs, so that there was no doubt about the direct influence of tone on the other properties of the muscle. With drugs, of course, it is uncertain whether the action is an indirect one through tone or a direct action of the drug on the particular property.

Before discussing the subject one should have a clear idea of what is meant by "tone." Unfortunately the phenomena of tone have attracted the attention of physiologists to a very small extent, but it has long been recognized that under normal conditions the skeletal muscles of the body are never in a condition of complete relaxation, and to this constant state of shortening or contraction the name of *tone* is given. A stimulus causes a further contraction—the normal muscle twitch—on the top of this condition of tone. Similarly during health the heart muscle never becomes completely relaxed during diastole, which means that it also is in a condition of tone, and its beats or contractions are superimposed on this tone. Unstriped muscle, too, exhibits the phenomenon of tone.

Porter [19] has suggested the probable hypothesis that muscle is capable of two kinds of contraction when stimulated: (1) the ordinary contraction, and (2) tone. These two kinds of contraction may be excited at the same time or separately, some forms of stimuli specially affecting the one and some the other. The ordinary muscle contraction has a refractory period, and is independent of the strength of the stimulus, provided the stimulus is maximal; while tone has no refractory period and is directly dependent on the strength of the stimulus. Tetanus is purely a phenomenon of tone, and recently Maydell [16], confirming Tschirjew, has shown that it is possible to get a tetanus without any oscillation (*i.e.*, a pure contraction of tone without any sign of the ordinary contraction). With increase of tone the size of the normal contraction which can be superimposed on the tonic shortening gradually diminishes, as is evident in any tetanus curve from voluntary muscle, until at last contractility is abolished and the tetanus curve becomes a straight line. This holds good for the heart also, the chief difference from skeletal muscle which cardiac muscle exhibits being that its tone is less susceptible to excitation by ordinary stimuli, so that it is a difficult matter to tetanize the heart. It is found, however, that this resistance to tetanization varies in different animals, invertebrate hearts being as a rule more easily tetanized than vertebrate. Nevertheless, all hearts can be tetanized by appropriate stimuli. In fig. 1 an example is given from the auricle of a tortoise, an example for which I am indebted to the kindness of Professor Porter. Further the insusceptibility of the heart muscle to increase of tone under stimulation is altered by drugs; for instance, a heart poisoned by chloral hydrate can be easily tetanized [21].

On looking at fig. 1 it is clear that with increase of tone the beats diminish in size, and that when tone decreases again, the beats become once more of normal dimensions. Of course with increased tone the cavity of any cardiac chamber becomes less, so that a smaller contraction is required to completely close it. No doubt the chamber is more completely emptied when the tone is considerable, but less force is required to do this than for the incomplete emptying of a toneless chamber. We have no reason to suppose that much more force is exerted than would be required to completely empty the chamber, since that would be a great waste of energy. We are justified in concluding, therefore, that less energy is expended on the beat with increased tone, and since the heart always contracts with the full force of which it is at the moment capable, this means that contractility is decreased with increase of tone. Still one must confess that this conclusion lacks absolute scientific proof. Such proof should be afforded by a careful record of the electrical changes accompanying the heart beats with different conditions of tone, and it is to be hoped that this investigation will shortly be carried out by some physiologist.

By direct stimulation an extra-systole could be produced with almost any condition of tone, and Porter [19] demonstrated that the stimulus for such an extra-systole was conducted more slowly when tone was greater, care, of course, being taken that the extra-systole was always excited at the same stage of the cardiac cycle. Tone can also be shown to diminish conductivity in unstriped muscle, since a ring of tonus can stop the peristaltic contraction of the intestine or may even turn back a peristaltic wave and send an antiperistaltic wave up the gut. With great increase of tone the heart is thrown into irregular contractions, especially the ventricles. Porter explains this phenomenon by the conductivity being so much diminished that small separate pieces of the heart wall are isolated from one another and

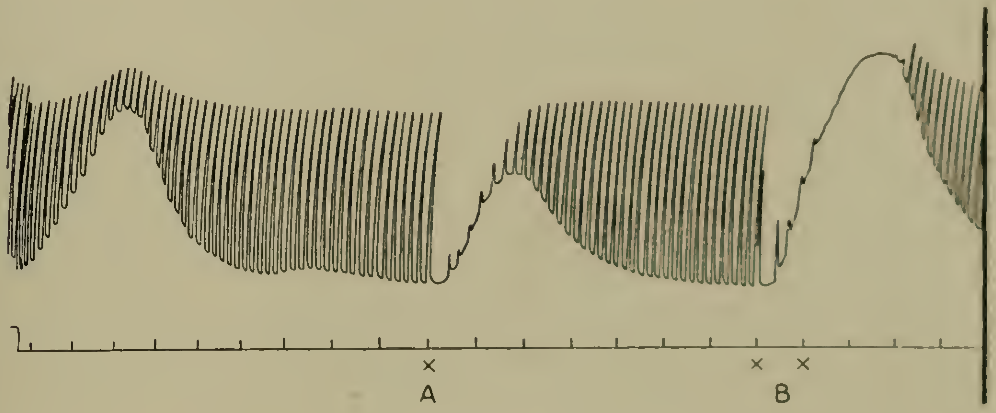

Fig. 1.

Tonus curves rom the auricle of the tortoise, showing superposition of tonus contractions and the absence of a refractory period. The lower line records every fifteenth second. The first tonus contraction was spontaneous. At the points marked with crosses the heart was stimulated with a break induction current, the secondary coil being at 5,000 of the Kronecker scale. (After Porter.)

contract independently the whole muscle thus contracting without coördination and in confusion.

It has thus been experimentally proved that increase of tone diminishes contractility and conductivity. Its influence on excitability and the rate of building up the normal stimulus has not been investigated. A diminution in these properties would be expected to result in a decreased rate of rhythm, but in Porter's experiments the rhythm remained unaltered. Where, however, the increased tone is produced by electrical excitation this would be expected to increase the rate of the heart, and that it has not done so may possibly be due to a diminution of excitability. In view of the more modern researches, which show that the stimulus is not built up by each individual muscle fibre, but is confined to certain fibres in the great veins, the auricles, and the auriculo-ventricular band, it seems very doubtful whether alterations in tone have any direct influence on the rate of stimulus formation.

Coming now to the consideration of human hearts, we find that the phenomena of dilatation of the heart conform with the theory as to the influence of tone on the other properties. In the dilated heart the diastolic relaxation is obviously greater than in the normal heart, or, in other words, tone is diminished. In association with this we find excitability increased, as shown by the increased rate and the frequency with which extra-systoles occur. Conductivity is probably also increased, since we find no lengthening of the interval between the time of contraction of the auricles and that of the ventricles—the *a* to *v* interval—although the heart is beating more rapidly. This is well illustrated by fig. 2, where the dilated heart is beating at the rate of 200 per minute, and yet the *a* to *v* interval is rather less than the normal one-fifth of a second. Since the whole interval between two successive beats of the heart is here only three-tenths of a second, a very short period is available for the recovery of the conductivity in the *a* to *v* fibres after the passage of a stimulus. It has to be remembered that Mackenzie [12] has recently shown that in a case where the heart was beating about 90 per minute, but irregularly, the length of the *a* to *v* interval was not affected by the varying length of the previous diastole. In this case, however, the shortest interval between any two beats was more than three-fifths of a second, and what one is justified in concluding from the tracing is that the conductivity was always fully recovered in three-fifths of a second, or possibly a little less. Experiments on animals show that the recovery of conductivity is a gradual process, requiring a certain amount of time, and it is probable that the same is true of human beings, especially as a very considerable time is required for the recovery of conductivity in cases where it is depressed (*see* fig. 4). Now it is very unlikely that under normal circumstances conductivity would be recovered as rapidly as is shown in fig. 2, and therefore we are justified in concluding that in association with the dilatation the conductivity is here increased. Mackenzie [12], from his vast experience, tells us that with a rapidly beating heart the *a* to *c*

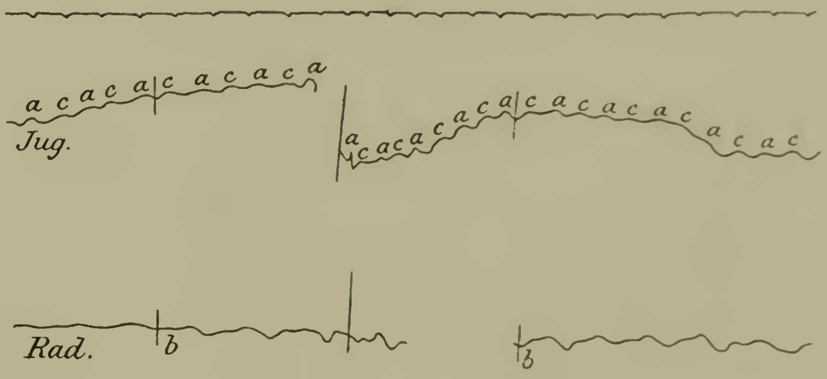

FIG. 2.

Radial and jugular tracings from a case of dilatation of the heart. The time marker records fifths of a second and shows that the pulse-rate is 200. In the centre of the record the clock has been stopped and two corresponding uprights obtained. A pulse-wave takes about one-tenth of a second to pass from the aorta to the radial, and uprights, *b*, have been drawn in the radial curve one-tenth of a second before the rise of the pulse-wave. Corresponding uprights in the jugular curve immediately precede a wave, *c*, due like the radial pulse to the ventricular systole. The wave, *a*, before this must be due to the auricle, and the time marker shows that the *a* to *c* interval is less than one-fifth of a second.

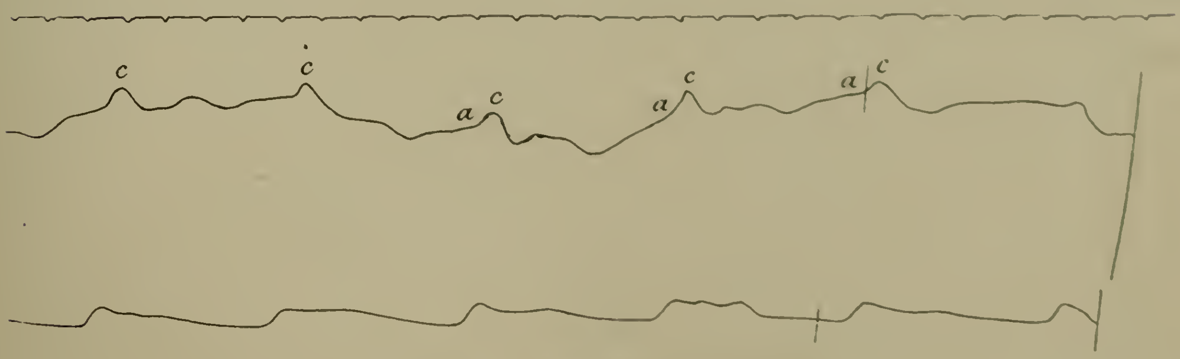

FIG. 3.

From the same patient as fig. 2 after treatment with strophanthus. The pulse-rate has dropped to 60 and the patient's condition greatly improved.

interval is rather less than normal, and so the conductivity is increased, probably by the same stimulus that causes the heart to beat quicker.

In the dilated heart contractility is also increased, since the heart has to perform more work to maintain the circulation, and in the majority of cases the circulation is, in a fashion, maintained. The intense labour performed by the heart, even when ineffectual, is a common clinical experience in cases of dilatation. This excessive expenditure of energy is always liable to be followed by exhaustion, and then the heart will fail in its task of keeping the circulation up to a sufficient standard.

Since the dilated, toneless heart has to work too hard, and is always in danger of failing, our object in treatment must obviously be to restore some of the lost tone. It is, of course, possible that this can be done by mechanical means; with diminished work there may be diminished pressure within the cardiac chambers, and this may help in the restoration of tone. At any rate the beneficial effects of rest and bleeding in cases of dilatation of the heart have long been recognized. Mechanical measures are, however, often insufficient, and have to be supplemented by the use of drugs. Unfortunately, the action of drugs is seldom a simple affair, and the results of experiments on animals are not always borne out in the clinical treatment of patients. The drugs employed in the treatment of dilatation and heart failure belong mainly to the digitalis group, and it is of great importance to understand their exact mode of action. Digitalis and strophanthus [7] have in animal experiments a very similar action, except that digitalis constricts the vessels while strophanthus does not, and thus digitalis has the greater effect of the two in raising the blood-pressure. Among other vessels, however, it also constricts the coronary arteries [11], and the flow of blood through the coronaries is of immense importance to the heart, increase of flow leading to increased size of the contraction, and *vice versa*. Even increased tension in the coronaries with an indifferent fluid, such as oil [22], may cause a quiescent heart to start beating again. Cushny [2] points out that digitalis has two opposing actions on the heart—(1) as a stimulus and (2) as a bridle—and that it is difficult to predict which result will follow its exhibition in a particular case. It seems possible that a very large part of the action of digitalis may be explained by regarding it as a powerful stimulus to the heart, very similar to the interrupted electric current in Porter's experiments. It would stimulate the vagus, the muscle directly, and tone.

In the hearts of animals the first effect of digitalis is usually to increase the size of the individual contractions, and at this stage the diastolic relaxation is often more marked, or, in other words, there is some diminution of tone [7] [8]. Together with these phenomena the rate of the heart is sometimes increased. Later there is a decided and gradual increase of tone, usually a diminution of rate and gradual decrease in size of the contractions. Still later the rate increases again with a further increase in tone, then delirium cordis may supervene, and the heart finally stops in a condition of excessive tone. The resemblance of all this to the phenomena accompanying gradually increasing tone in Porter's researches on the auricle of the tortoise is very striking, the main difference being that with digitalis the whole process to the stoppage of the heart in excessive tone or tetanus takes much longer. Closer investigation has shown that excitability to direct stimulation is decreased in digitalis poisoning [1] [10]; while conductivity is also diminished, even sometimes to the extent of causing a block between auricle and ventricle. Since Porter has demonstrated that increase of tone is sufficient to produce decrease of contractility (as shown by the diminished size of the beats) and decrease of conductivity, the action of digitalis in lessening these two properties must be partly due to its effect in augmenting the muscle tone and *may* be entirely due to the alteration of tone. The diminution of excitability is probably also partly due to the same cause—an increase of tone. Loss of tone is certainly associated with increased excitability, so that it is probable that increase of tone would lead to decrease of excitability. The increased rate which appears later in digitalis poisoning is probably due to direct stimulation of the muscle by the digitalis, while the terminal delirium cordis would have the same causation as the similar phenomenon noted by Porter with increased tone, the ventricle not contracting as a whole, but isolated portions of the wall contracting separately, owing to decrease of conductivity. Indeed, Sowton [23] noticed that samples of digitalis that caused marked delirium cordis usually also brought about a striking decrease of conductivity, as shown by the number of the auricular beats that were not conducted to the ventricle. In this connection it is interesting to note that Muskens [17] has offered a similar explanation for the occurrence of alternating action of the heart in digitalis poisoning. This action, where the beats are alternately large and small, although the intervals between them are approximately equal, has usually been attributed to failure of contractility, but

Muskens regards it as resulting from a depression of conductivity which leads to isolation of portions of the ventricular wall, and after every normal beat a contraction of only part of the ventricle.

From animal experiments, then, it seems that digitalis acts at first as a stimulus to the heart, increasing the contractility and often the rate, possibly also conductivity and excitability. Later it stimulates tone, and with increased tone there is diminution of contractility, excitability [1] and conductivity. Naturally if any one of these properties be previously injured, the effect of digitalis on it would be more marked. Thus von Tabora [24] found that if the A to V bundle be crushed the subsequent administration of digitalis causes ventricular beats to drop out much earlier than with a normal heart. Digitalis also causes marked slowing of the heart rhythm. The action of the drug seems to be partly on the vagus and partly directly on the muscle, since the depression of conductivity does not show itself so early when the vagi are cut [24], and there is very little slowing of the rhythm after the injection of atropine [8]. The occurrence of delirium cordis suggests that digitalis may also directly stimulate the muscle fibres to contract, a view which is further supported by von Tabora's observation that before the stage of fibrillar twitching there is a tendency for extra-systoles of the ventricle to appear.

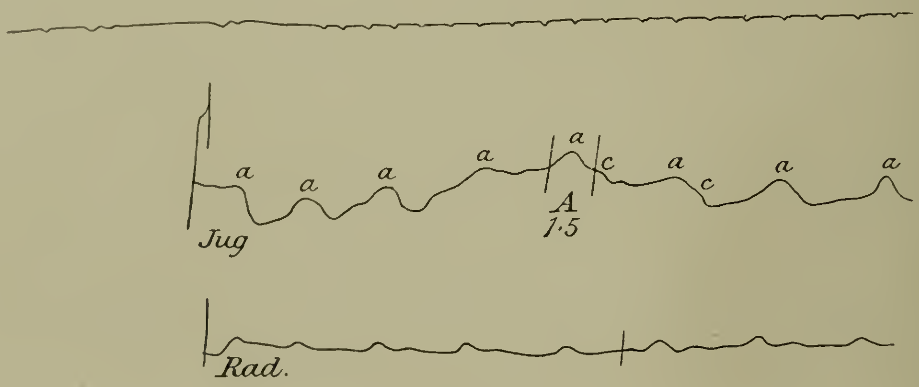

FIG. 4.

From a patient with valvular heart disease and failure of compensation. The pulse-rate is 92. The jugular tracing shows that the *a* to *c* interval is longer than normal, the interval marked *A* being three-tenths of a second instead of the normal two-tenths of a second.

In human beings the amount of the drug that reaches the heart must be small, and the amount that it is possible to administer is limited by the irritant effect of digitalis on the gastro-intestinal tract.

It is to be remembered, however, that the drug is cumulative [3] in its action, so that a considerable effect might be produced by small doses continued over a long time. The irritant action on stomach and intestine is not observed with strophanthus [8], and this possibly constitutes one of its dangers. The early stage of stimulation is difficult to demonstrate in clinical work, although it may be of importance. Practically, however, as Mackenzie [13] has recently pointed out, it is only in cases of dilatation that marked results are obtained, or, in other words, that digitalis acts therapeutically mainly on the function of tonicity. Improvement often occurs quite suddenly, although the drug may have to be administered for several days before any effect is produced. Very rapidly there may be a sensible decrease in the dilatation, the œdema may diminish, the liver shrink in size, and there may be a decided rise in the blood-pressure and in the amount of urine secreted. Coincident with the decrease in the dilatation the rhythm becomes less frequent and any irregularity is lessened. The decrease in frequency and irregularity is no doubt partly due to diminution of the excitability, though direct stimulation of the vagus may be the cause of a decreased rate of stimulus production, and so a less frequent rhythm. Mackenzie has shown that a normal heart, or a diseased heart which is not at the same time dilated, is practically unaffected by such doses of digitalis as can be given to men by the mouth. This is perhaps only what should be expected, since it is probable that a smaller dose would be required to increase the tone of a dilated heart (*i.e.*, where tone is much diminished) than to add to the tone of a heart where it is already at the normal standard. The excitability of tone varies with different circumstances in animals, and no doubt has the same variability in human beings. It is in cases of recent dilatation, or recent increase of dilatation, where the muscle is healthy, that the tone of the human heart seems especially susceptible to the influence of digitalis. There are, of course, cases which do not respond to the drug although there is dilatation of the heart. In these the cardiac muscle is probably severely injured, as, for instance, by the toxin of an acute fever or by a myocarditis. In other more chronic cases the elasticity of the cardiac walls may be lost.

Experimentally tone diminishes contractility and conductivity, and not improbably excitability also, so that we should expect digitalis, when it increases tone in men, to decrease these other properties. Its effect on excitability is apparent, the diminution of rate and of irregularity showing its restraining influence. There are, however, instances where a heart which was originally regular becomes irregular under the administration of digitalis. This irregularity is of several kinds, of which the commonest form is the development of a "bigeminal action," where an extra-systole follows each normal beat. A bigeminal action is not uncommon in over-excitable hearts where no drug has been employed, and a probable explanation of its occurrence after digitalis is that the decreased rate has allowed a hidden bigeminal action to appear. For this explanation to be applicable it is necessary that the interval before the extra-systole should be longer than the intervals between adjacent beats before the administration of digitalis. Hering [9] showed that a bigeminal action might be made to disappear by giving atropine, its disappearance coinciding with the time when the normal rhythm became so rapid that a normal beat occurred exactly at the moment when the extra-systole would be expected; any rate faster than this was regular, while any slower rate, as shown when the effect of the atropine wore off, was of the bigeminal character. A bigeminal action is not necessarily constant, and we should not always expect a constant bigeminal action in cases occurring after digitalis. It is not necessary, therefore, to assume that in these cases the digitalis causes an increase of excitability contrary to its usual action of decreasing excitability.

A second type of irregularity after digitalis may be produced by the occurrence of isolated extra-systoles. This might, of course, be merely a consequence of reduction of rate, since with a rapid rhythm there is very little opportunity for the occurrence of extra-systoles. In figs. 5 and 7 there are extra-systoles which cannot be explained by a mere reduction of rate, because the intervals before them are less than five-tenths of a second, and the rate, before digitalis was given, was 92 per minute, and the intervals between successive beats over six-tenths of a second. In this case, therefore, there is no reason from the rate alone why the extra-systoles should not have occurred before the treatment with the drug. On leaving off the digitalis, too, the heart again became quite regular, although the rate was only very slightly increased.

The extra-systole (x in fig. 5) is evidently of ventricular origin, since the large wave $a + c$ occurs simultaneously with it in the jugular at exactly the time when an auricular wave would be expected with regularly beating auricles; there is, too, no sign of an auricular wave previous to this large wave; x' is probably also a ventricular extra-systole. von Tabora [24] noted the development of ventricular contractions independent of the auricle in some of the animal hearts which he was

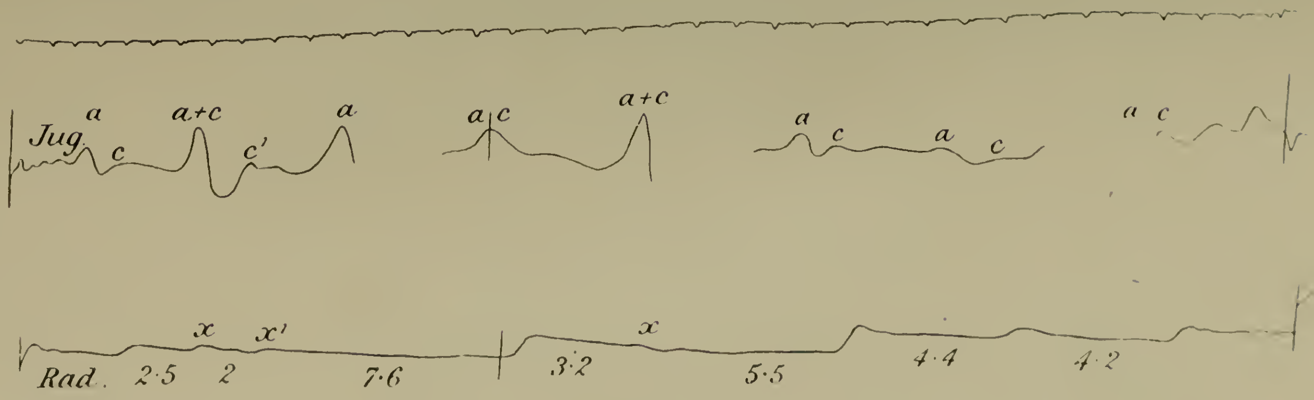

Fig. 5.

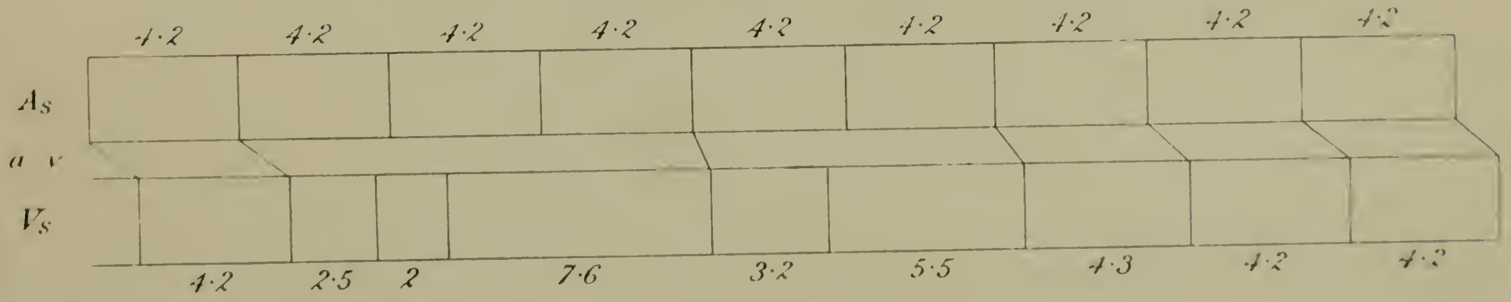

Fig. 6.

From the same patient as fig. 4 after a week's treatment with digitalis. Fig. 6 is a diagrammatic representation of fig. 5. *As* represents the auricular systole, *Vs* the ventricular systole, and *a* - *v* the auriculo-ventricular interval. The auricles are beating regularly at intervals of 4·2 fifth of a second, and the *a* to *c* interval is still a long one, 1·5 fifth of a second. After the second ventricular systole an early extra-systole of the ventricle occurs, and in the jugular tracing a large wave *a* + *c* is found, the auricle contracting while the ventricle is still in systole. The next ventricular beat may result from this auricular contraction, and if so the *a* to *c* interval is much prolonged (over two-fifths of a second), but more probably it is another ventricular extra-systole. The succeeding auricular systole is a large one and has no ventricular systole associated with it (heart block). Then again there follow normal auricular and ventricular systoles, but with a very short *a* to *c* interval, the conductivity having recovered with the prolonged rest. Another ventricular extra-systole follows with a large *a* + *c* wave in the jugular. The *a* to *c* interval after this becomes a little longer, but not the full 1·5 fifth of a second, which is not reached until the succeeding beat, so that this interventricular interval is rather more than the normal 4·2 fifths of a second.

poisoning with digitalis, and it seems possible that digitalis may itself act as a stimulus and directly excite a contraction. This seems a more probable explanation than that digitalis, contrary to its usual depressant action on excitability, has in these cases increased it.

This particular patient illustrates yet another type of irregularity after digitalis, but this has to do with the depression of quite a different property of the muscle, namely, conductivity. There is abundance of evidence that digitalis depresses conductivity in animals, and Mackenzie [14] has shown that the same action takes place in human beings provided that conductivity was somewhat depressed before the drug was given. This was the case in this patient. In fig. 4 the *a* to *c* interval, instead of the normal two-tenths of a second, is decidedly longer, namely, three-tenths, showing that the stimulus takes longer than usual to pass along the A to V bundle, in which, therefore, the conductivity is depressed. After digitalis, as shown in figs. 5 and 7, the *a* to *c* interval is still three-tenths of a second in spite of the diminished rate, and in fig. 7 a ventricular beat is actually dropped out. It is noticeable that, in the beat previous to this intermission, the *a* to *c* interval is further increased in length, possibly due to some influence on conductivity exerted through the vagus. After the intermission there is a striking recovery of the conductivity, as shown by the shortened *a* to *c* interval. There are also intermissions of the ventricle due to depressed conductivity after the second extra-systoles in both tracings. A diagrammatic representation of these two tracings is given in figs. 6 and 8. In some cases there may be an apparent improvement in conductivity after digitalis owing to the slower rate giving more time for its recovery. In view of the small doses that it is possible to administer it is not surprising that depression of conductivity by digitalis is only observed clinically in cases where there is already evidence of its being damaged.

The effect of digitalis on contractility is more difficult to estimate. There is no doubt of the more efficient working of the heart when digitalis has been given in suitable cases. This is partly due to the mechanical advantage of the decreased dilatation brought about by increased tone, and partly due to the fact that the slower rate allows a longer time for the contractility to recover. In animal experiments, however, it is clear that both an increase of tone and the administration of digitalis result in a diminution of contractility. This drug, too, often produces an alternating action of the heart, which has been supposed to

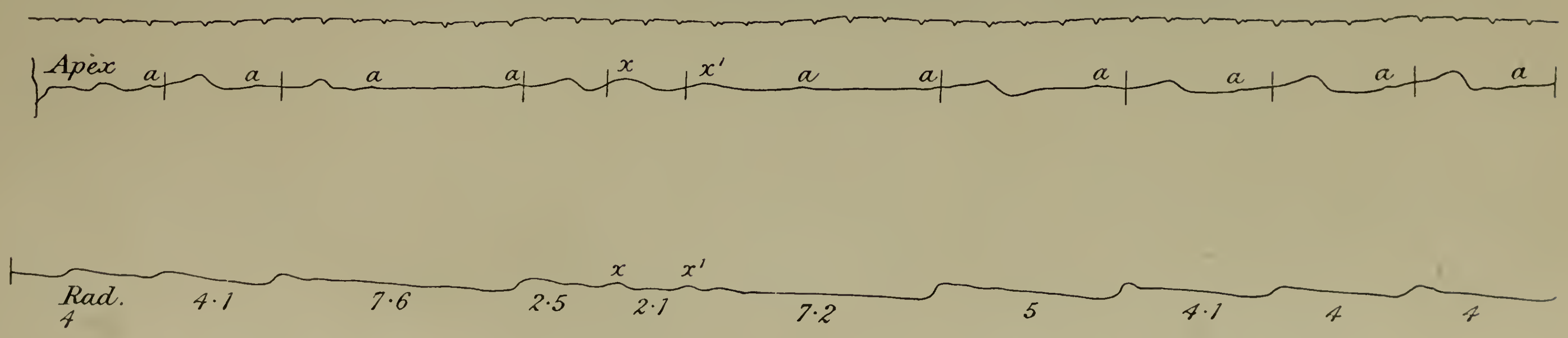

Fig. 7.

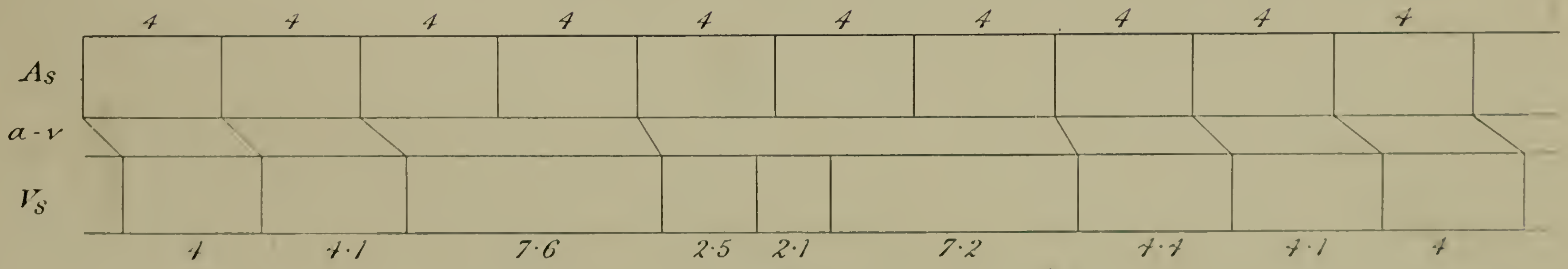

Fig. 8.

From the same patient as fig. 5 taken a few minutes later. Fig. 7 shows the radial pulse and a tracing from the apex taken together. The commencement of the outflow from the ventricle is marked in the apex tracing by upright lines, and is preceded by the small wave, *a*, due to the auricular systole. Fig. 8 is a diagrammatic representation of fig. 7. The heart is beating more rapidly than in fig. 5, and the auricular systole occurs regularly at intervals of four-fifths of a second. After the second systole there is, for some reason, a decided increase in the *a* to *v* interval, and then after the third systole a ventricular beat is dropped out (heart block), although the auricle beats at the normal time. This is followed by a marked recovery of conductivity, as shown by the shortened *a* to *v* interval. Then there is another ventricular beat dropped out after two ventricular extra-systoles, just as in fig. 5. Following this there is a gradual lengthening of the *a* to *v* interval in successive beats until it is again 1·5 fifth of a second.

be the expression of damaged contractility. An apparent alternating action of the heart has been observed several times after digitalis in human beings. Hering and Rihl [20] are of opinion that most of the so-called cases of alternating action of the heart are really due to late extra-systoles (*i.e.*, a bigeminal action), though they do not deny that a real alternating action does occur, which they attribute to lowered contractility. Mackenzie's [15] cases after digitalis come into their category of genuine alternating action. Both Mackenzie and Gibson [4] found no diminution of conductivity in their cases of alternating action after digitalis, and this weighs strongly against Muskens' view that this type of action is due to depressed conductivity and local action of the ventricular wall. Thus the evidence of depression of contractility by digitalis in the human heart seems sufficiently clear, and we can have no doubt of this action of digitalis from the results of animal experiments. Probably only those patients whose contractility was already depressed would show any further recognizable lowering with digitalis.

The foregoing arguments afford sufficient justification for affirming that tone plays the same important rôle in the human heart as in the animal, and that increase of tone has the effect of diminishing the other properties of the cardiac muscle, namely, contractility, excitability, and conductivity. This conclusion, too, is of considerable clinical importance. The recognition of loss of tone as the important factor in dilatation of the heart was a great advance, and we now find in addition that many of the phenomena associated with dilatation are directly due to this loss of tone. The dependence of the other properties on tone affords a remarkable method of self-regulation in the heart, so that it is enabled to do just the amount of work that is required of it. The well-known diagram of Martius (*see* fig. 9) commands general acceptance. This represents the total power of the normal heart by a line *a* to *c*, of which only a portion, *a* to *b*, is required for the work of the circulation in repose, while the rest, *b* to *c*, is called the reserve of force. In a case with a compensated valvular lesion the power required during repose is much greater, *a'* to *b'*, but there is still a reserve, *b'* to *c'*, though much smaller than in the normal heart; the total force is increased owing to some hypertrophy. In uncompensated valvular lesions there is no reserve, the whole force being required for the maintenance of the circulation in repose. In the diagram the total force is represented as less with heart failure, but it is obvious that this is not necessarily the case, as with great dilatation even a full expenditure of the force represented in the middle line may be insufficient. Loss of power or contractility may be a factor in failure of the heart in these cases, but failure may also occur without any loss of power from excessive dilatation. This third line more accurately represents the failure in older people from muscular degeneration and associated dilatation. Since the heart always contracts with the full force of which it is at the moment capable, there must be something which lessens the contractility of the normal heart compared with the dilated heart of valvular disease and prevents its full possible force being expended in repose. This something might be a tonic nervous influence, but of this there is no evidence, and it is much more likely to be the tone of the cardiac muscle itself, since increase of tone diminishes contractility. Thus the reserve force of

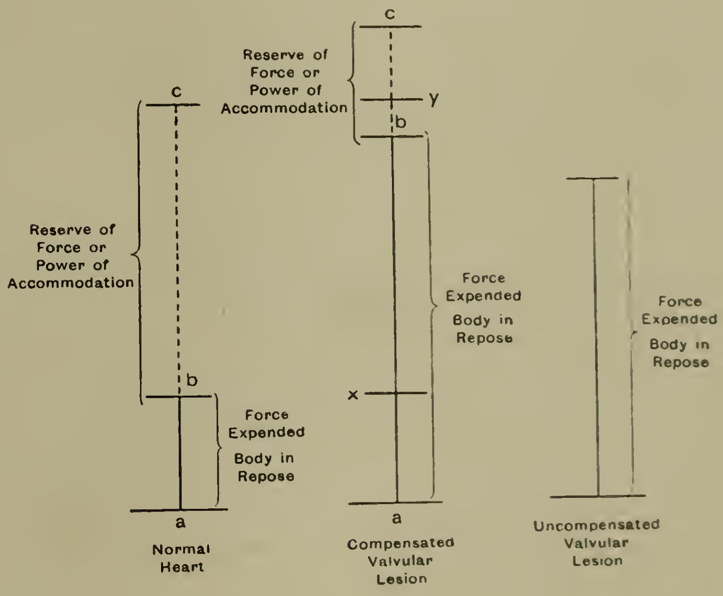
c
Reserve of Force or Power of Accommodation
b
Force Expended Body in Repose
a
Normal Heart
c
Reserve of Force or Power of Accommodation
y
b
Force Expended Body in Repose
x
a
Compensated Valvular Lesion
Force Expended Body in Repose
Uncompensated Valvular Lesion

Fig. 9.

(After Martius.)

the heart is really dependent on the tone of its muscle, and with dilatation (loss of tone) this reserve is liberated in the shape of increased contractility, excitability and conductivity just when it is most needed. Of course the greater the dilatation the less the reserve there is to call on for any extra effort. This method of regulation is only in addition to the well-recognized regulatory apparatus through the cardiac nerves, but is evidently just as important.

Some light is also thrown on the obscure subject of the action of digitalis on the heart, though it cannot be said that this question is completely answered. Part of the action of digitalis is evidently secondary to its influence on the muscle tone, but how much of the damage done to contractility, conductivity and excitability comes from increased tone and how much from stimulation of the vagus cannot at present be estimated. The narrowing of the coronary vessels would probably also tend to depress the properties of the cardiac muscle to an extent that is incapable of exact appreciation. It is important to note that in the case cited above the digitalis had greatly improved the patient's general condition as well as the general working of the circulation in spite of the grave depression of conductivity and the occasional dropping out of ventricular beats. Mackenzie's and Gibson's patients had also benefited from the drug, although contractility was so damaged that there was alternating action of the heart. Evidently the improvement results from the increase of tone, and these facts receive their simplest explanation in the conception of tone that has been advanced in the present article.

Clinical Account of the Patients from whom the Tracings were Obtained.

J. H., aged 21, carman, was first seen in April, 1907, when he complained of shortness of breath, pain over the heart, and swelling of the feet. The heart was dilated, apex beat in the nipple line, superficial cardiac dulness to the right border of the sternum and edge of liver three fingers breadth below costal margin. There was some cyanosis and the pulse-rate was 200 per minute. He refused to come into the hospital, and was given tinctura digitalis ♏v. every six hours. Next week he returned greatly improved; the cyanosis and œdema had disappeared, the liver had returned to its normal size, and the dilatation of the heart was appreciably less, while the pulse-rate had come down from 200 to 64. On auscultation an apical systolic murmur could be heard, and also a diastolic murmur down the sternum. The patient returned to his work as a carman, and was able to do it fairly well until the end of the year. On January 31, 1908, he again came to the hospital, complaining that for the preceding three weeks he had noticed pain over the heart, increasing shortness of breath, and some swelling of the feet. On examination there was marked cyanosis and dyspnœa, and some œdema of the feet and legs. The apex beat of the heart was in the fifth space in the nipple line ; the superficial cardiac dulness extended to the third rib and to the right edge of the sternum, and there was marked epigastric pulsation. A systolic bruit could be heard at the apex, and the rate of the rhythm was 200 per minute (*see* fig. 2). The edge of the liver was three fingers breadth below the costal margin. He was admitted into the hospital under Dr. de Havilland Hall, who kindly allows me to use his notes. Tinctura strophanthi ♏vii. every six hours was ordered, and on February 4 the pulse-rate suddenly fell to 60 and the patient felt much better (*see* fig. 3). The œdema and cyanosis rapidly disappeared, and the liver became of normal size. With the reduction of the rate it was possible to hear a diastolic bruit down the sternum as well as the apical systolic murmur. About ten days later he was discharged from the hospital and remained in fair health (able to do his work) until he was last seen on April 3, except for some rheumatism in one knee.

E. S., aged 17, a housemaid, came to the hospital at the beginning of January, 1908, complaining of shortness of breath on exertion. There was a history of a previous attack of rheumatism. She had a flushed face and was slightly cyanosed. Her heart was dilated and hypertrophied, with an apical systolic murmur. On January 21 she was decidedly worse; there was more dyspnœa and marked cyanosis ; the heart, too, was more dilated, the superficial cardiac dulness extending to the right border of the sternum, and in addition to the apical systolic murmur there was a systolic bruit at the bottom of the sternum ; the liver was enlarged (three fingers breadth below the costal margin) and there was slight œdema of the feet. The pulse-rate was 92, and a jugular tracing showed evidence of some depression of conductivity between auricle and ventricle (*see* fig. 4). As it was not possible to admit this patient into the hospital she was told to lie up at home, and was ordered tinctura digitalis ♏v. every six hours with ether and ammonia. She returned next week very much improved. The cyanosis and œdema had disappeared and there was no enlargement of the liver, and she asserted her capability of returning to work. The dilatation was decidedly less, the cardiac dulness only coming up to the left edge of the sternum. The pulse-rate was less frequent, but the heart action was strikingly irregular, especially on standing upright (*see* figs. 5 and 7). The digitalis was stopped and the patient has remained in fair health up to the present time. On leaving off the digitalis the irregularity completely disappeared, but all the tracings still show depression of conductivity as estimated by the length of the *a* to *c* interval.

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DISCUSSION.

The CHAIRMAN (Dr. Lees) said he was sure all had listened with great attention to the paper. The subject was comparatively new, but of the most fascinating interest. The work which had hitherto been done with regard to it had been mainly due to Dr. James Mackenzie, and he would ask that gentleman to offer some observations.

Dr. JAMES MACKENZIE said he had not much to say because he found some difficulty in grasping the full meaning of the many details which the paper contained, but he would look forward to the perusal of the paper later. He had, however, followed with much interest the descriptions of the charts which the author projected on the screen, and he believed they included some observations which had not been given before, either in connection with digitalis or the heart's action. That was so particularly where the author spoke of the possibility of two extra-systoles occurring after one another, followed by a very long pause. He (Dr. Mackenzie) had examined a large number of cases of extra-systole, but he had never seen a tracing comparable to the one now shown. No doubt digitalis was at the bottom of it, but without careful consideration he was not prepared to say whether he agreed or disagreed with the explanation offered. A matter which had puzzled him a long time, but on which the paper threw some light, was that of tonicity. So far its meaning was, as yet, being merely groped after—it was a very difficult subject. But from careful daily watching of patients he had seen their hearts suddenly dilate, and that was sometimes accompanied by a greatly increased rapidity. He did not see why the latter should occur, because if one accepted, as he thought was inevitable, that dilatation was the outward and visible sign of failure of tonicity, he did not see why it should affect the rate, but if Dr. Gossage's contention was true, that with an increase of tonicity there was a depression of those other functions, such as that which caused an increase in rate, *i.e.*, rendered the heart muscle less excitable, the contrary condition would be brought about, and when depression of tonicity occurred there would be a greater excitability of the starting place of the heart, and therefore a great increase of rate, such as was seen in failure of the heart with dilatation. The inquiry being pursued by Dr. Gossage in regard to the action of digitalis on the human heart was one of very great importance, and one which needed clearing up, as the profession was in a state of confusion in regard to the cases which benefited by digitalis. He thanked Dr. Gossage for bringing the matter to his notice.

Professor CUSHNY said the subject of tone was a rock on which many had split because it had been so very indefinite. He always looked with some suspicion on tonicity as a term which might hide many different ideas. His own difficulty had been to know the difference between tone and elasticity. One of the first observations on the subject was that of Schmiedeberg, who ascribed the whole action of digitalis to a change of elasticity, and it was interesting to find Dr. Gossage coming back to a somewhat similar view, which he did not think anyone had taken up for the last quarter of a century. The difficulty in regard to digitalis was its double action: its action on the muscle and its action on the inhibitory function. But he thought the evidence was now fairly definite that diminished conductivity was really a vagus inhibitory effect. He had derived that impression from some tracings which Dr. Mackenzie showed to him, and it had been brought out by Hering and Rihl clearly that the decreased conductivity was an inhibitory symptom and not the effect of muscular action. He was very much interested in Dr. Gossage's idea that increased tone led to lessened contraction, although he thought he would have to accept it with caution. Nothing dilated the heart and diminished tone more effectually than inhibition, and there could be no question that inhibition reduced conductivity and excitability, but contractility perhaps not so much. Another thing which dilated the heart, and therefore might be said to reduce its tone, was chloroform; that would dilate the heart as much as it was possible, but it did not increase conductivity or contractility. In the case of digitalis there was the difficulty due to the double action which he had mentioned, and Dr. Gossage must take into consideration those agencies before his view could be considered to be quite demonstrated.

Dr. ALEXANDER MORISON said that as a reactionary against the muscular theory and one who was not converted to absolute myogenicism in regard to cardiac activity, he desired to put in a plea for the nervous system as having a larger share in the production of the effects of the action of digitalis and the variations of cardiac action which had been shown than had been allotted to it.

The action of the heart was not all muscular. Muscle had its function just as peptic and other specific cells had theirs, and he suggested that muscle could do very little unless it were one of a series of factors in the production of organic action. The influence of the nervous system and of the blood could not be eliminated, and there were possibilities of variation in organic action, whether digestive, secretional, or muscular, as they were all varieties of motion due to changes in one or more of the factors named. Myogenicism was not an accepted creed ; it was on its trial. In the presence of Dr. Mackenzie, for whose work he had the greatest admiration. he was sceptical as to the value of the waves seen on the screen. The graphic method of the study of clinical cases had been productive of much and valuable information; but when undulations recorded were obscure and required minute calculation for interpretation, he suspected the possibility of error and could not attach great value to them. Some of those illustrating Dr. Gossage's remarks appeared to him to have this character.

Dr. H. A. CALEY said that as the paper touched the borderland between pharmacology and clinical therapeutics he desired to bring forward one or two points in support of Dr. Gossage's main contention. It seemed to him (Dr. Caley) that the clinical study of cardiac weakness, especially conditions of cardiac myasthenia associated with dilated heart, strongly supported the far-reaching influence of the myogenic factor. In that direction lay the great value of the paper ; it tended to give precision to what many physicians had been slowly led to ; to regard the evidences of cardiac myasthenia—not only the presence of a dilated heart, but other evidences also—as the special indication for the use of digitalis. So much was that so that it was hardly going too far to say that if there was cardiac myasthenia, apart from degenerative changes, one might be certain that digitalis and its congeners would do good. On the other hand, if digitalis and the other members of the series failed to make an impression on an embarrassed heart, the explanation in many cases was that the heart muscle was depressed from some other cause, and hence failed to respond to the muscular stimulus. One or two points occurred in that connection. Dr. Gossage more than once referred to interference with the coronary circulation as being of much more importance than was sometimes thought in connection with derangements of the heart and in relation to the employment of cardiac tonics. In not a few cases where digitalis failed to make an impression, if there was an opportunity of examining the heart post mortem, one of two conditions might be found : either degeneration of the coronary arteries—*i.e.*, the heart muscle had been in a state of relative ischæmia—or degenerative changes in the myocardium. He thought more importance would, in time, be attached to another series of factors as tending to explain the failure of response on the part of the heart muscle to some of the cardiac tonics, *i.e.*, various conditions of toxæmia. Professor Cushny had referred to the powerful effect of chloroform in depressing the heart muscle and producing extreme dilatation. From the clinical standpoint physicians were familiar with the fact that a heart which was poisoned by alcohol failed to respond to digitalis and the other members of the series until the influence of the alcohol had begun to diminish. And was it not probable that other toxins came into play in the same connection? It was a matter of common experience that in chronic valvular disease with failure of compensation the best results were obtained not from the administration of digitalis alone, but from its use in conjunction with other measures, particularly rest and eliminative measures such as the regulation blue pill and saline aperient draught, or a sustained course of treatment which acted on the portal circulation. By the eliminative measures the embarrassment of the right side of the heart was mechanically relieved: but was it not probable that another explanation applied, not only in valvular disease but in many other cardiac conditions, namely, auto-intoxication of intestinal origin? He thought there could be no doubt clinically that the muscular was more important than the nervous element in the cases under discussion, and his view was that much was due to toxic depression of the heart muscle. The paper certainly strengthened the clinical view that the special indication for digitalis and its allies was cardiac myasthenia associated with dilatation, the principal effect of that drug being to improve the tonus of the heart muscle.

The CHAIRMAN (Dr. Lees) thanked Dr. Gossage for his most interesting paper. He agreed with Dr. Mackenzie and Professor Cushny that it was difficult at once to appreciate duly all the details of the paper, but he looked forward to reading it. He asked whether Dr. Gossage thought it possible to explain the action of digitalis on the heart simply from its local effect on the cardiac muscle or nerves. Did he not think there was also a bulbar influence to be considered—an action on the cardio-inhibitory centre? Was not the vasomotor contraction caused by digitalis in great measure due to an action on the vasomotor centre? Also, was it not possible that cardiac tone was, in part, like the tone of skeletal muscle, a spinal reflex constantly in action, just as in the case of the skeletal muscles? He believed that an acute dilatation was an indication of loss of tone, and that it was most important, because it furnished a clinical means of appreciating loss of cardiac tone, which was caused by many morbid conditions. If one thing was more needed by the profession than anything else, it was an improvement in cardiac percussion. In the text-books stress was laid on what was called the superficial cardiac dulness, which was worth practically nothing from the cardiac point of view. It was most important to determine, in every case examined, the true size of the heart, which could be done by careful percussion. It was then easy to show acute dilatation of the heart in certain common diseases. For instance, in diphtheria there was often acute dilatation of the left ventricle, which revealed itself by certain obvious physical signs and accompanying symptoms of great importance. Unless that was realized by the practising physician, he might easily overlook it and consider that the patient was convalescing when he was really on the borders of the grave. The same thing occurred in influenza, and he supposed all present had met with cases of patients who had had a comparatively slight attack of influenza, and who, to everyone's surprise, had suddenly died. In cases of this kind careful percussion showed an acute dilatation of the left ventricle. Again, in acute and subacute rheumatism there seemed to be almost invariably dilatation of the left side of the heart, though not of so serious a nature as that caused by diphtheria and influenza. The physician should be on the look-out for these acute dilatations, which he believed to be due to the toxic action of the various microbes causing the disease. He agreed with what Dr. Caley said about the clinical indications for the use of digitalis. Just as he mentioned with regard to alcohol, so with regard to the acute toxæmias of diphtheria and influenza, in the early stages digitalis was not of the slightest service, and he found this true also in the acute dilatation of rheumatism. But in chronic dilatation with a low tension pulse it could be given with advantage. With regard to the myogenic or the neurogenic source of cardiac action, it had been pointed out by Foster and Balfour years ago that the cardiac pulsation might be detected as early as on the second day of fœtal life, before there was any differentiation of the structure into muscle and nerve. Therefore, was it of any use to discuss whether the action was myogenic or neurogenic? Somehow it was deeper than both. And recent investigation seems to point to surviving remnants of this primitive tissue as the true source of the cardiac pulsation, even in adult life.

Dr. GOSSAGE, in reply, said it was difficult to put the question of the action of digitalis on the heart into its proper bearings, particularly in relation to clinical facts. The paper was an attempt to apply clinically the effects which had been observed in animals. It was possible that digitalis acted on the central nervous system, but so far experiments had only been done with it on the heart itself. There was no doubt that the drug acted on the nerves in the heart as well as on the muscle, and certainly many of the phenomena were due to action on the vagus, but some of them, he thought, were due to direct action on the muscle through tone. There was strong evidence in support of that in such experiments as Porter's, where an increase of tone occurred entirely apart from drugs. It was very difficult to find out the exact details of the action of a particular drug—only gross results could be seen. In the case of the heart it was possible that such a drug as chloroform might cause dilatation, and at the same time might so injure the heart muscle as to decrease all the properties of heart muscle. In the same way in the various toxic conditions occurring in acute disorders, this result might ensue. He agreed with Dr. Caley that where dilatation of the heart did not respond to digitalis, there was something present beyond the mere dilatation due to loss of tone. All the qualities of the heart might be decreased by some toxin acting on it, and therefore loss of elasticity might result. He agreed with Professor Cushny as to the difficulty of distinguishing between tone and elasticity—physicians wanted the physiologists to say what the distinction was. He believed that Porter's views were most likely to be correct, namely, that tone was a kind of contraction, and therefore something quite distinct from elasticity. No doubt the cardiac tone was exactly the same thing as the tone of skeletal muscle, and, as Dr. Lees suggested, it possibly depended on reflex action from the spinal cord; but it was not so dependent on the spinal cord as was skeletal muscle, because there was still tone in the heart when entirely separated from the influence of the spinal cord.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE FIRST

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1907-8

NEUROLOGICAL SECTION

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1908

LONDON:
JOHN BALE, SONS AND DANIELSSON, LTD.,
OXFORD HOUSE,
GREAT TITCHFIELD STREET, OXFORD STREET, W.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE

NEUROLOGICAL SECTION.

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The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

Neurological Section.

October 31, 1907.

Dr. CHARLES E. BEEVOR, President of the Section, in the Chair.

THE PRESIDENT said that before proceeding to the discussion of cases he desired to say a very few words on the occasion of their first meeting as a Section of the Royal Society of Medicine. He did not propose to deliver an address, as he had had that opportunity last February. The Neurological Society had been in existence over twenty years, and during that time it had had a most successful career. In June of the present year it was decided that the Neurological Society should join the Royal Society of Medicine. He hoped—and he felt sure it would be so—that the meetings of the Section in the future would be as successful as had been those of the now defunct Society. He extended a hearty welcome to the Fellows at that first meeting.

Case of Myatonia Congenita.

By C. E. BEEVOR, M.D.

Female, aged 20 months. Family and previous history good. At twelve months was beginning to walk and talk; had bronchitis for three weeks, and on recovery could not stand or walk, or move legs, which were becoming thinner. During last four months the power in the legs has improved.

Condition on Admission.—Mentally sharp, but passes urine and fæces involuntarily at times. General wasting and marked flabbiness of muscles, especially of legs. Passive movements can be carried out through an excessive range. Active movements can all be feebly performed. Trunk muscles stronger; the child can sit up well.

No deep reflexes obtained. To electrical currents the muscles are less excitable than normal, but there is no polar change. Since admission there has been improvement in power and return of deep reflexes in the arms.

Case of Toxic Affection of Muscles and Lower Neurones.

By C. E. Beevor, M.D.

Male, aged 64, shoemaker. Family history good. Admits gonorrhœa, but not syphilis or alcoholic excess, or exposure to lead.

History of Illness.—February, 1907, gradual loss of power in hands and feet, beginning in left hand, then right hand, left leg and right leg, in the course of two months. Onset associated with cramps, but no subjective sensory symptoms.

On admission in July, 1907, patient was helpless and unable to turn in bed. Cranial nerves, slight nystagmoid jerkings on extreme deviation, weakness of both sterno-mastoids. Trapezii, spinati, teres, act well. Pectoralis major slightly affected. Latissimus dorsi, deltoid, biceps supinator, triceps, flexors and extensors of wrist all profoundly paralysed, the extensors more than the flexors. Fingers can be flexed slightly, but not extended. Flexion and extension of thumb absent; abduction, adduction and opposition just possible.

Intercostals strong, diaphragm weak, abdominal recti and erectores spinæ strong.

Flexors of hip weak, extensors strong. Flexors and extensors of knee fairly good. Ankle and toe movements very poor. All muscles show rippling fibrillation starting at one end, usually the upper, and spreading to the other. All forms of sensation perfect.

All deep and superficial reflexes absent.

Electrical Reactions.—Upper limb, very marked diminution or absence of reaction to faradism in all muscles; with galvanism a strong current is required, and R.D. is present in most of the muscles.

Pathological report on excised portion of muscle by Dr. Gordon Holmes: (1) Vitreous degeneration of fibres in various stages, hyperplasia of sarcoplasm and nuclear proliferation; (2) simple atrophy of small numbers of fibres; (3) no affection of the intramuscular nerve fibres.

Progress.—Steady improvement from the beginning of treatment by massage and faradism. In the upper limbs the improvement has been very slight since the middle of September. Some slight wasting has occurred, chiefly in the arms, and the direct irritability of the muscles was at one time much increased.

With regard to the first case Dr. Beevor said there had been only one other case recorded in this country, and that was by Dr. Collier, in the early part of the present year. According to Oppenheim, the condition was always congenital, but in the present case the parents thought the child was quite well until the attack of bronchitis. To produce electrical reactions very strong currents were required. To galvanism, though there was no reaction of degeneration, it required a current of 11 milliampères to excite the tibialis anticus and the extensors of the toes. The case differed from one of anterior poliomyelitis in that the muscles reacted to faradisation, with the exception of the tibialis anticus, in which there was no reaction, even with the secondary coil 4 cm. from the primary. The disease had not been known long enough for one to be able to say whether recovery was possible. There was probably arrested development of the muscles, and perhaps of the anterior horns. The muscles were not atrophic. One fatal case had been recorded by Spiller, of Philadelphia, in which the muscles of the sole of the foot and of the calf had a hyaloid appearance and were diminished in size. The central nervous system and the peripheral nerves were normal. The second case was probably of toxic origin, affecting the muscles and the lower neurones. Only a few such cases had been recorded.

Dr. J. S. Collier said the case of myatonia was typical, but it differed from the other two cases which he had seen in that the condition seemed to be limited to the lower extremities and the lower part of the trunk. The condition in Dr. Beevor's case did not appear to have been noticed until some time after birth, according to the history. Two of the other published cases seemed to have begun at some distance from birth, the child having acquired natural movement and gained some experience in walking.

Dr. S. A. K. Wilson said that since the disease was described by Oppenheim in 1900 17 cases had been placed on record, but it was questionable whether all the cases were of the same nature. Probably some of them were instances of the polyneuritis of infancy. But there were 10 or 12 which fell into that category. Two Italian cases did not begin in the very early months of life, the patients having been able to use their limbs more or less. Something more about the pathology was known since the publication this year (in *La Semaine Médicale*) of a paper by Baudouin, whose account of the morbid anatomy was more complete than Spiller's. The case was apparently typical of myatonia in a child four months old, who died of broncho-pneumonia. It had never been able to stand or move its limbs. In the cortex there were no noticeable changes. In the cord the anterior horn cells were markedly diminished in size. In addition the anterior roots were a quarter the size of the posterior roots. In the nerves there was little that was abnormal to be seen. The condition of the muscles was suggestive of myopathy; there was a sclerotic condition of muscle fibres, which were very irregular in size. There was some hyaloid degeneration and marked nuclear proliferation. It was desirable to get to know more about the condition. Some suggested that it was an amyoplasia, others thought there was a central change. Baudouin's case suggested that it might be called a disease of the lower neurones, extending from the anterior horn cell to the nerves and muscles. Whether the muscle degeneration was the result of the other, or simultaneous with it, or independent of it, he did not know.

Dr. CAMPBELL THOMPSON said he had seen at Middlesex Hospital what seemed to be a typical case. The legs were chiefly affected, the arms slightly, and the trunk not very much; the child could sit up perfectly. He supposed the fact that the condition was not met with in adults was in favour of the view that such cases did get well.

Dr. WILFRED HARRIS asked whether there was any special preference for the name myatonia congenita. It seemed to closely resemble myotonia congenita. By adopting the name of amyatonia there seemed less likelihood of confusion.

Dr. GORDON HOLMES asked why the case was not recorded as one of myopathy. One of the characteristics of so-called myatonia congenita was that it was congenital. In the present case there was a definite history that the child walked at the usual age, and the limbs became weak only after an illness. Dr. Wilson had mentioned a point with regard to the pathology of the condition. He, the speaker, thought the fact that the anterior horn cells were small, though apparently not diminished in number, and that the ventral roots were also small, was no argument that the disease was a primary affection of the lower motor neuron. He had recently examined two cases of myopathy of different types. In the first, the pseudo-hypertrophic type, it was remarkable that there was no visible wasting of the ventral roots, and very little diminution in the size of the cells of the anterior horns. But in another typical case of myopathy, which died at 16 years of age, there was marked degeneration of the anterior roots, visible even to the naked eye.

Dr. ORMEROD asked, with regard to Dr. Beevor's second case, whether there was any evidence or fact in the history of the patient of any toxin; or was it called toxic from analogy with some other cases the toxic nature of which had been proved?

Dr. HOLMES said he had examined under the microscope a small portion of the muscle which was excised from the patient, but there was much difficulty in examining such a small portion of any organ. The most striking feature was the intense vitreous degeneration of the fibres. This was never secondary to a nerve lesion, but was always due to a primary toxic degeneration of the muscles. He could not detect any wasting due to nervous disease.

The PRESIDENT, in reply, thanked the members for discussing the cases at such length. He used the name myatonia congenita because the disease was first discovered by Oppenheim, and so named by him. It was possible that in all the cases the condition was not the same; perhaps the cases which began at birth were not the same as those in which the disease was noticed some time later. He was asked whether it was not a myopathy. Myopathy was a congenital disease, and yet it did not always begin at birth; sometimes it did not show itself until some years afterwards. As to the pathology, he thought his case was a peripheral muscular condition, rather than an affection of the anterior horns. In the second case there was no history of poisoning, but he used the term toxic because it was more like a condition of poisoning, and on account of the report of Dr. Holmes on the portion of muscle which was excised.

Case of Slowly Progressive Hemiplegia.

By WILFRED HARRIS, M.D.

E. L., aged 35, in September, 1905, had some pain in muscles of the left upper arm; she noticed about the same time that the hand became very blue and cold, and she suffered from chilblains on that hand for the first time in her life. In January, 1906, she began to lose the use of the index and middle fingers of the left hand.

When first seen on January 23, 1906, the hands were intensely cyanosed, and there was marked weakness of the movements of the whole of the left upper limb, especially of the fingers. There was no muscular wasting, but extreme spasticity of the wrist and fingers, with increased deep reflexes of the fingers, wrist and elbow.

Sensation was absolutely normal to all forms, including the sense of position.

Electrical.—Some diminution of irritability to faradism in all muscles of the left upper extremity, with very pronounced cyanotic reaction in the intrinsic hand muscles.

Knee-jerks were equal and brisk. Pulses very feeble on both sides.

There was no weakness of the legs or any abnormality, except that she complained of the left foot feeling colder. Sphincters normal. No headache, optic neuritis, sickness, or any other intracranial symptom. Since January, 1906, the symptoms have slowly progressed, until in February, 1907, the left hand had lost all power of movement, with only slight movement of the elbow. In February, 1907, the first trace of involvement of the left leg appeared, transient weakness and dragging, with left knee-jerk +, but flexor plantar. In May, 1907, she dragged the left leg, and the left plantar was absent. Now, in October, 1907, there is permanent dragging of the left leg, and the left plantar is now extensor. There is still no trace of anæsthesia on the hand or foot, or any sign of intracranial lesion. The spine, neck, and thorax appear normal.

Dr. WILFRED HARRIS said he had brought the case in the hope of receiving some light on it, as to whether there was a growth, or some primary sclerotic lesion, such as in primary lateral sclerosis, or in amyotrophic lateral sclerosis without the atrophy. The latter view was the one he favoured. He could not imagine a growth in the spinal cord or brain damaging the motor area sufficiently to cause such marked paralysis, but with no trace of sensory affection. He alluded to what he had called the cyanotic reaction. While the hand was cold and blue the faradic reaction was very slowly produced, but after the hand had been in hot water for five minutes there was a brisk reaction.

Dr. PARKES WEBER said that in 1897 he showed a case before the Clinical Society. The patient was a man aged 24, who, from the age of 19, developed a gradual hemiplegia, in which the lower part of the face was also affected. The cyanosis of the affected upper extremity was very marked. In that case there was a great tendency to laugh violently without adequate cause, and in that respect it differed from the present one. He believed that the lesion in his case was in the upper part of the brain, his suggestion at the time having been that there was a gradual sclerosis of one of the cerebral hemispheres.

The PRESIDENT said the question was whether the lesion was in the cervical cord, or higher up in the internal capsule, or in the cortex. He had tried to ascertain whether the lesion was above or below the respiratory centre. He was interested in the action of the latissimus dorsi as a cough muscle. With a lesion of the internal capsule or cortex there was loss of voluntary movement in the latissimus dorsi, but not loss of reflex bilateral movements on coughing. But if there was a lesion below the respiratory centre, *i.e.*, in the upper cervical region, if there was diminution of the action of the latissimus dorsi as an arm muscle, there was also loss of movement of it as a coughing muscle. In the present case, although the movements of the latissimus as an arm muscle were weak, when the patient coughed it acted as well as on the other side, which would place the lesion higher than the upper cervical region. He thought it was probably a primary sclerotic lesion, allied to amyotrophic lateral sclerosis.

Dr. HARRIS, in reply, said the case referred to by Dr. Parkes Weber was an interesting one. That gentleman had just shown him the report of the case, which showed more pronounced cerebral symptoms than his own, and there was also palsy of the palate. Dr. Parkes Weber's report did not mention sensory changes. He feared his own case would develop symptoms on the other side also ; the reflexes on the right side were already more brisk than formerly.

Case of Myopathy.

By JAMES TAYLOR, M.D.

Dr. TAYLOR said he first saw the patient eight years ago, and at that time she had marked affection of her face, especially affecting the orbiculares of eyes and mouth, and the typical myopathic facies of the Landouzy-Déjerine type. There was very little affection of her arms. Now, eight years later, she had the face condition still more marked, as well as very marked affection of the shoulder girdle, and lordosis. She was now, therefore, a well-developed case of the facio-scapulo-humeral type of myopathy. The legs were strong, and the reflexes natural. She was one of five sisters, the second in the family, the other four being quite healthy. The only trace of a family failing in the same direction was in a cousin, the son of her father's sister, who, apparently, was affected in the same way.

Case of Nerve-root Grafting.

By PERCY SARGENT, F.R.C.S.

F. C., male, aged 19. Shown by Dr. F. E. Batten, before the Neurological Society in July, 1906, as a case of brachial plexus palsy, following influenza two months previously. Two weeks after the illness pain in right shoulder and arm. Power in right arm suddenly lost at this time. When admitted to the National Hospital in June, 1906, there were weakness and wasting of deltoid, spinati, triceps and biceps. An area of anæsthesia and analgesia over shoulder and outer side of upper arm. Treated by massage and electricity.

When re-admitted three months later the weakness and wasting were most marked in deltoid and spinati, and the scapula was winged. Biceps and supinator longus fairly good. Electrically, deltoid, spinati and serratus magnus gave no response to faradism, and showed polar changes to galvanism. Area of analgesia diminished. Operation. Fifth cervical root exposed and tested with faradic current. The root was split longitudinally into an upper part which alone gave, on fairly strong stimulation, feeble contractions of deltoid and spinati; and a lower, which gave contractions of biceps and supinator longus. The upper portion was divided and its peripheral end turned down and implanted into the sixth root. Primary union. Three weeks later some affection, both sensory and motor, of the sixth root area, which passed off in two or three months. Electrical treatment continued; gradual improvement. Now, fourteen months after operation, deltoid and spinati are much increased in bulk and can be used voluntarily with considerable degree of power. Deltoid and spinati react to faradism. No sensory changes remain.

Dr. H. HEAD said he gathered that the operation was performed five months after the injury, and that some improvement had already then begun in the biceps and supinator longus. In a case of trauma of the shoulder one did not expect much improvement in much less than a year, and if improvement had already been noticed he thought it would have been best to leave it alone. He asked whether the paralysis of the deltoid was increased by the operation. (Mr. Sargent: No.) Mr. Sargent was not, then, dealing with the root which governed it. He maintained that the root which Mr. Sargent divided had nothing whatever to do with the return of power. He thought the case followed the course of an ordinary well-treated traumatic case. There was nothing to show that the operation had anything to do with the recovery, and he feared there would be too much operating on such cases in the future before they were ready.

Dr. HINDS HOWELL said that Dr. Head based his argument on the fact that section of the root made the muscles no worse. He had had the opportunity of observing the case for a long time while under his care, and he did not see that any such effect could have happened, because there was no voluntary power of any sort present in those muscles.

Dr. WILSON said he had followed the case, and had seen the operation, but he had not followed the boy so carefully since he had been under Dr. Howell's care. He was inclined to agree with Dr. Head, and attribute the recovery to the post-operative careful treatment. Mr. Sargent admitted that some muscles had improved which could not have been influenced by the operation. The serratus magnus was paralysed when the boy came in, and the triceps was affected, yet both of those had improved, especially the serratus magnus, which was not affected by the operation. Moreover, it seemed almost incredible that one should be able to divide the diseased fifth root so accurately that all the fibres dealt with were those going to the deltoid. The deltoid had improved in all its fibres, and Mr. Sargent said that stimulation of the part of the fifth root which he left did not produce any effect on the deltoid. But it was conceivable there were some fibres still going to the deltoid, and those were absolutely untouched by the operation. Some credit in the recovery should be given to that part of the fifth root which was left untouched by Mr. Sargent.

Dr. WILFRED HARRIS demonstrated by a diagram that the posterior and anterior fibres of the root did not mix, and that it was conceivable they might be split by the knife. He had no doubt that had been done by Mr. Sargent. An illustrative case was one he had four years ago, and it was for that he devised the operation, so as to cut off the fibres for the deltoid. It was a case of infantile paralysis, in which the muscles had remained completely paralysed with R. D. for five months. Operation was carried out just as Mr. Sargent had described, and it was followed, ultimately, by very good recovery. Nothing happened for the first seven months, and then a trace of improvement was seen, and in fifteen months the child could put its arm above its head. That was as positive a proof as one could have that the deltoid might have recovered by the nerve-grafting operation; certainly stimulation proved that those were the fibres which supplied it. Stimulation of the lower part and of the sixth root showed nothing.

Mr. SARGENT, in reply, said the bundles which constituted the fifth root could be isolated without any cutting, namely, by mere separation, as easily as the peroneal could be separated from the popliteal division of the nerve of the thigh. Dr. Head's remarks assumed the mixing of the fibres in the fifth root, and that he, Mr. Sargent, must have traversed some fibres which were crossing in the root.

Case of Isolated Paresis of Right Serratus Magnus.

By ERNEST JONES, M.D.

(Under the care of Mr. A. H. TUBBY.)

Male, aged 4.

Family History.—Negative.

Previous History.—Mother discovered two years ago that right shoulder-blade was prominent. No previous illness or accident.

Present State.—Healthy boy, with no signs of disease except as follows: Right scapula elevated, not tilted. Vertebral border and angle prominent at rest, but greatly more so on flexing shoulder-joint. Protrusion of right upper limb weak; elevation above head fair. Serratus magnus not palpable.

The PRESIDENT said he thought there was some paralysis of the serratus magnus, although it was not completely paralysed. The scapula did not go so much forward into the axilla on the right side as on the left, and one could easily keep the scapula back. He believed it to be a congenital case.

Case of Muscular Atrophy with Delayed Thermal Sensation.

By Mr. KILGOUR (for Dr. LEONARD GUTHRIE).

F. V., aged 20. Family and previous history unimportant. In February, 1906, first noticed weakness and slight wasting of hands. This has gradually increased since. Previous to this had frequently blistered fingers while smoking cigarettes. Although no pain was felt at the actual moment of injury, a few seconds later a sensation, similar to that caused by a burn on any other part of the body, was experienced.

Present Condition.—Pupils slightly unequal, right being larger than left. Left reacts to light more briskly than right. Cranial nerves otherwise normal. The hand muscles are atrophied, producing *main-en-griffe*, and react sluggishly to faradism. All other muscles are well developed and powerful. Skin of fingers glossy. No anæsthesia or analgesia. Over arms and upper part of chest heat and cold are frequently confused. There is delay of a few seconds before thermal stimulus is appreciated. This is best marked on hands. There is blunting to the faradic current over the dorsal and palmar surfaces of both hands and along inner sides of forearms and upper arms. Over the ulnar sides of hands this amounts to anæsthesia. Deep pressure over forearms and hands causes no discomfort, although an equal degree applied to other parts is painful. Scoliosis present. No arthropathy. No increase of deep reflexes. Plantars flexor.

Dr. Guthrie said that not many years ago a case of that kind would have been regarded as one of progressive muscular atrophy. Then, when syringomyelia was first brought to notice, a case in which there was no distinct loss of pain and thermal sensations would not have been regarded as syringomyelia. Though the present case did not exactly conform to the descriptions of syringomyelia, he thought there was justification for regarding it as such. A point of interest was the diminution to the pain sense produced by the faradic current in certain areas. The patient felt a sensation from strong faradism, but not the pain which it caused on other parts of the surface.

Case of Segmental Pan-hypertrophy.

By S. A. K. Wilson, M.D.

Female, aged 26, in the National Hospital, under the care of Dr. Risien Russell.

The patient comes of a markedly neuropathic family, though there is no record of any similar case having occurred before. Her mother suffered from fits of an indefinite nature during the whole pregnancy, and was eclamptic during at least one other confinement.

When the patient was born, according to the mother's description, "she was in blue and red patches; the whole of the left arm was liver-coloured; her toes were red-blue, like plums; there were little swellings like blackberries on her neck and genitalia; the left arm was very big, and looked almost as long as the child."

This congenital hypertrophy of certain parts of the body has remained the feature of the case. At present the left arm is much larger than the right; the left thorax is rather larger than the right, and so is the left breast; the left leg is slightly larger than the right. It must be noted, however, that the right foot and leg cannot be considered normal, and that the first two fingers of the right hand are larger in proportion than the others of that hand. The face is entirely normal and symmetrical, and so is the cranium. The hypertrophy is a true one, affecting bones and soft tissues alike, hence I propose the term "segmental pan-hypertrophy" for the condition. The telangiectatic and pigmented areas of the skin, which occur on either side indifferently, except that on the abdomen they are practically confined to the left side, must be noted. Their frequent occurrence in such cases seems more than a coincidence.

Dr. Parkes Weber said he believed the class of case described by Dr. Wilson was not so very rare as was generally supposed. He, Dr. Weber, in July of this year, published, in the *British Journal of Dermatology*, a paper on angioma formation in connection with hypertrophy of the limbs and hemi-hypertrophy, and in connection with that he collected nearly all the cases he could hear of. In some of the cases, especially when one limb was affected, there was some evidence that the primary condition was a congenital or developmental hypertrophy of the vascular parts of the limb or particular part of the body. In other cases the vascular lesions seemed to attack all parts to some extent. In that particular case of Dr. Wilson's, however, he thought there was evidence that the vessels were more affected on the side chiefly involved by the hypertrophy. There was a tawny-port-wine stain all over that part which stopped at the mid-line.

Case of Huntington's Chorea.

By E. Farquhar Buzzard, M.D.

Male, aged 49. Healthy until two years ago, when he had a "nervous breakdown" lasting about two months, during which he had difficulty in speaking.

Six months ago he first noticed involuntary movements of the legs and trunk, associated with some pain in left leg and abdomen. Movements have continued with varying intensity. Latterly he has become stupid, memory failing and some depression.

Family History.—Difficult to obtain on account of patient's mental condition. One brother died at 25, said to have been "all on the work," and to be childish and very irritable—in an asylum. Two sisters, who were married and had families, died about ten years ago; patient thinks they suffered from "movements."

Present Condition.—Choreic movements, affecting chiefly the trunk and large limb muscles.

Mental Condition.—A bad witness, volunteers nothing and answers questions inaccurately. When tested in various ways he shows a very fair memory for time and place, a poor visual memory for faces, &c., inaccuracy in reading, and a tendency towards repetition in recalling a number of names.

Beyond some general muscular weakness, there is no evidence of organic disease.

Case of Disease of the Cervical Vertebræ: with Pressure Symptoms.

By E. Farquhar Buzzard, M.D.

Girl, aged 15. Previous history uneventful.

In January, 1906, without any assigned cause, she began to suffer from pain in the middle line of the neck posteriorly, which did not radiate. During the month the neck gradually became stiff, and she noticed a small swelling about the size of a walnut, which was rather tender. In the course of two months she became unable to move her head at all, except slightly to flex it, and by June, 1906, the swelling had increased to its present size. A month or two later the pain vanished, and, with one or two trifling exceptions, there has been no return of it. At the end of 1906 came a gradual return of movement in the neck, and she has been able to move it more or less freely ever since.

In March, 1907, the right arm began to feel numb and gradually weakened, and a week or two later the right leg began to drag. For three months these limbs were more or less completely paralysed. In June there was retention of urine for three weeks. In July the right leg began to improve, till now patient thinks it is almost as good as the left. The right arm has improved to a less extent, the patient being now able to move only the fingers and the wrist slightly. She has been confined to bed since April.

There is a large, rounded, hard, painless swelling occupying the back of the neck below the level of the hairy scalp. The spines of certain of the cervical vertebræ can, however, be distinguished. This part of the neck is rigid, but the movements of the head are remarkably free. Strings of firm, discrete, slightly-swollen glands may be felt in the cervical triangles. The right arm is immobile at shoulder and elbow; the hand is of the *main-en-griffe* type. The left arm is rather weak, the grasp especially, and there is slight wasting of the small muscles of the hand on this side, though not to the same extent as in the right. Both legs are weak, especially the right. There is a diminution of the sensation of pain in both legs, more on the right side, and in both arms, more on the right side. The deep reflexes are everywhere brisk, with double knee-clonus, and a double extensor response. Since admission to hospital there has again been a certain amount of retention of urine.

Dr. FARQUHAR BUZZARD said the first case was a fairly straightforward one, the only difficulty being the indefinite family history. Cerebrospinal fluid had been obtained by lumbar puncture, and examination showed that it was quite normal. He presumed that the second case was that of caries, and he did not think he had seen another exactly like it, either in regard to the clinical features or to the skiagraphic picture. He asked for views on diagnosis and treatment. He was reluctant to advise surgical interference, because the disease appeared to have come to a standstill; on the other hand, the girl had had six months' constant rest on her back, without improvement in the paralytic condition.

Dr. HEAD asked what was the experience at Queen Square in laminectomies for caries of the spine?

Dr. Wilson, in reply to Dr. Head's question, said that a short time ago he went over all the records of cases of caries of the spine which had been operated on at Queen Square during the last two-and-a-half years. Seventeen such cases of tuberculous origin had been operated upon, and many of them were very advanced. Of those, ten had died, six were worse, and only one was a little better. One girl was brought into the hospital paralysed and walked out. She had now returned to the hospital.

Mr. Donald Armour said there was a great difference in the prognosis of spinal caries in adults as compared with children, being distinctly worse in the former. That accounted for the large percentage of failures in the cases referred to by Dr. Wilson. He had been much struck with the rapid recovery of children after laminectomy, as compared with adults.

Dr. Grainger Stewart said the statistics given were certainly very unfavourable, but he thought that they would be less so if, after operation, the patient could have nine months on his back and sanatorium treatment. He had seen three cases in which paraplegia was completely cured and in which it did not recur. There were also several cases which were cured and recurred, but in each of those rest re-established the cure. In those cases the patient had had a definite trauma, which started the symptoms. Surgical treatment should be carried out hand-in-hand with the medical and sanatorium treatment.

Dr. James Taylor said that a few years ago he had a case similar to Dr. Buzzard's, with regard both to the paraplegic and the pressure symptoms. That patient recovered without operation, and she remained well, in spite of the complication of very severe heart disease. Mr. Armour had referred to a point which was of very great importance, namely, that the prognosis of caries in adults was much worse than in children. Another point was that it was very rarely one had occasion to ask the surgeon to operate in caries in the child, because children got well under appropriate medical treatment.

Dr. Buzzard, in reply, said that he would prefer to treat the case without operation, owing to the danger of lighting up the disease, but there must be a time limit, after which recourse should be had to something besides rest. The cases of cervical caries he had seen operated upon had done remarkably well, compared with those affecting the dorsal region.

Neurological Section.

December 4, 1907.

Dr. C. E. Beevor, President of the Section, in the Chair.

Some Peculiarities of Cerebral Gummata.

By J. S. Collier, M.D.

The object of this paper is to bring before you certain facts and suggestions relating to that form of cerebral syphilis of which the clinical manifestations are headache and optic neuritis, with or without localising symptoms.

A patient has recently been under my care in the National Hospital whose clinical history shows several of the points that I wish to emphasise. It is from this case that the specimens of cerebral gumma, which are before you to-night and which have been prepared by Dr. Holmes, have come.

A very brief outline of this case will suffice to show certain peculiarities of importance. The patient was a middle-aged man who had had some years previously a venereal sore which had not been followed by any other manifestations of syphilis. In the spring of 1907 he began to suffer with a fixed pain in the left occipital region of the head and with slight epileptic attacks, and he had occasional diplopia. He was treated with iodide of potassium in moderate doses, but his symptoms persisted and became rather worse. I saw him first in May and I could find no other signs than the headache and the occasional fits. There was no optic neuritis. He was put upon mercury and iodide in full doses for four weeks. Neither the headaches nor the fits were materially improved by this treatment, and in August a quadrantic hemianopia was noticed for the first time; there was still no sign of optic neuritis. He was again put upon mercury and iodide, but in spite of this the fits became more severe, the hemianopia became more extensive, and three weeks later, while still taking antisyphilitic remedies, he developed an optic neuritis. He was taken into hospital and the outer surface of the left occipital pole was explored by Mr. Armour, who found and removed a multilobed gumma which was growing from the dura and was pressing into the convexity of the left occipital lobe. The tumour was exceedingly firm and tough, and was of cartilaginous consistency, showing no tendency to any caseation. The patient made an uninterrupted recovery, the hemianopia persisting.

The features of this case to which I wish to call attention are these:—

(1) The patient presented no signs of other syphilitic lesions, past or present.

(2) The symptoms had developed insidiously and had progressed slowly.

(3) The symptoms had progressed and optic neuritis had developed while the patient was taking antisyphilitic remedies.

(4) The growth was of an exceedingly hard and tough consistency with no signs of caseation. So hard was it that at the operation it was presumed to be a fibro-sarcoma. It is difficult to conceive of a growth of this consistency becoming absorbed even under the most vigorous antiluetic treatment.

The absence of other syphilitic lesions, past or present, in those who are the subjects of cerebral gumma is a fact that has been so strongly emphasised by nearly all the authorities who have written upon this subject as almost to suggest the conclusion that in a case of intracranial tumour the presence of syphilitic lesions in other regions of the body would be in favour of the cerebral growth being of some other nature than syphilitic. This is, of course, absurd, but the deduction is that the presence of other lesions due to syphilis is a most uncertain indication that the cerebral growth is syphilitic, and their absence is no indication whatever that it is not syphilitic.

One of the peculiarities of the cerebral gumma, then, is that it is so often the sole lesion that appears, the primary manifestations being of course excepted.

The symptoms of this case had developed insidiously. Now, Sir William Gowers and several other authorities have laid down that one of the clinical characteristics of the intracranial gumma is the rapidity with which it grows, comparable with the rapid growth of a subcutaneous gumma, and the fulminant nature of the symptoms produced, with a rapid oncoming of severe optic neuritis. Now I have seen, and I expect all of you have seen, cases of cerebral growth in syphilis with an insidious onset, and cases with a fulminant onset. I have a suggestion, which is, I think, worthy of your consideration, regarding some of the cases with a severe onset and rapid progress.

We may divide cases of cerebral syphilis with optic neuritis and other symptoms of intracranial tumour into two groups:—

(1) Those in which localising symptoms are present.

(2) Those in which there are no localising signs, but in which headache, stupor, vomiting and optic neuritis are the main features of the clinical picture.

I think that the rapidly oncoming cases belong chiefly to the class with no localising symptoms and the insidious cases to the class in which localising symptoms are present. I think further that the severe cases without localising symptoms are more amenable to treatment and recover more rapidly than the insidious cases with localising symptoms. I have seen a good number of these rapid and severe cases, and I think they have all recovered under antisyphilitic treatment with the exception of two cases. These two cases died very soon after they came under observation, and at the autopsies was found no growth at all, but simply a condition of hydrocephalus. In one of these cases the cause of the hydrocephalus was not apparent, in the other the cavity of the fourth ventricle was, to a large extent, obliterated by a simple adhesion of the roof to the floor of that cavity. Two small, hard, cicatrised lumps, the size of peas, were found in the frontal region in this case, and they were certainly the remains of gummata long since healed.

I submit to you, then, that in some of those cases of syphilitic cerebral disease characterised by a rapid development of headache and optic neuritis without localising signs we are dealing with cases of acute hydrocephalus resulting from syphilitic ependymitis, and that the majority of such cases recover under antisyphilitic treatment, which brings about a re-establishment of the normal hydrostatic conditions of the cerebro-spinal fluid.

The early appearance of optic neuritis in the acute cases suggests that some general condition is responsible for the symptoms rather than a localised gumma, since the latter, growing from the membranes and involving the brain tissue from without inwards, and being most frequently situated in the region of the hemispheres, is the least likely to be associated with an early onset of optic neuritis.

The increase of the symptoms and the appearance of the hemianopia and optic neuritis while the patient was under the influence of antisyphilitic remedies was remarkable, but it is not a very uncommon event in localised cerebral gummata. The following explanations for this event are possible:—

(1) That the treatment employed was not sufficiently energetic.

(2) That the growth underwent a fibroid transformation as the result of treatment without much shrinking in volume.

(3) That the symptoms of intracranial tumour and their increase are dependent upon some secondary change in the cerebral tissue in the immediate neighbourhood of the growth, and not to the actual increase in size of the growth itself. (The hardness of the growth at the time of operation made it very unlikely that the growth was increasing in size at the period of the most rapid development of symptoms.)

The very hard and firm consistence of the growth in this case, and the absence of any sign of caseation, suggested the impossibility of its complete absorption by medicinal treatment.

Sir W. Gowers has drawn attention to an indurative change in cerebral gummata as the cause of the non-disappearance of local symptoms. Such a fibroid transformation without much diminution in bulk, even after years, is sometimes seen in subcutaneous gummata. It is probable that such a change is responsible for the persistence of the local symptoms in cases of syphilis of the base of the brain characterised by multiple and permanent cranial nerve palsies.

The possibility that a gumma of the brain may not disappear as the result of adequate antiluetic treatment makes surgical interference imperative in those cases where symptoms are increasing, in spite of adequate medicinal treatment, provided always that the localisation is exact and is such as to allow of the probability of successful removal without too great damage to the more important regions of the brain, especially the motor region. In cases where the symptoms have reached a severe intensity before treatment is commenced, and where definite localising symptoms are present, surgical interference amounting to the opening of the skull over the region of the gumma, and perhaps opening of the subdural space, also without any attempt to remove the growth, is suggested as the best course to relieve urgent symptoms and to gain time for the thorough exhibition of antiluetic remedies.

It is of great importance to bear in mind that the symptoms of intracranial growth may entirely disappear under antisyphilitic remedies when the nature of the growth is other than syphilitic. In three cases where this had occurred the symptoms remained in abeyance for over a year, but returning proved rapidly fatal. Autopsy revealed a large tuberculoma in one case and fibro-sarcoma in the other two cases.

The conclusions that these remarks suggest are as follow:—

(1) The differential diagnosis between syphilitic tumours and non-syphilitic tumours of the brain can only be arrived at clinically from the

results of antiluetic treatment, and the diagnosis so obtained is far from certain.

(2) Syphilitic cases of acute onset, characterised by absence of any localising symptom and by the severity of the general symptoms, including optic neuritis, are probably cases of acute hydrocephalus resulting from syphilitic ependymitis.

(3) Certain changes of a fibroid nature occurring in a cerebral gumma may cause a regular increase in the symptoms, in spite of treatment and the persistence of local symptoms.

(4) In cases where symptoms increase in spite of treatment, surgical interference at an early date is advisable, either for the purpose of relieving urgent symptoms and allowing an exact diagnosis of the nature of the growth to be made by the microscope, or for the purpose of extirpating the gumma where this procedure can be carried out without causing great damage to important regions of the brain.

DISCUSSION.

Sir VICTOR HORSLEY said that the question which Dr. Collier had raised was a most important one, and it was very interesting to have it brought before the Section now, because recently in Germany, where the same subject was discussed, an opposite conclusion was arrived at. He was sure it was because the idea of treatment there was based upon hard and fast rules, instead of the very practical issues which had been raised by Dr. Collier. The Section was especially indebted to Dr. Collier for his differentiation between diffuse and localised cases. As he (Sir Victor) had only a few days ago operated upon a case in which there was a small gumma that had grown under treatment, and it bore closely on what the author had been saying, he thought those present would like to hear of the case. It was that of a man whom Dr. Risien Russell saw about six weeks ago, and whom he himself saw directly after that consultation. The history was that on two previous occasions he had had a Jacksonian fit, which consisted simply of motor aphasia; there was said to be no twitching. Although the practitioner in charge said that syphilis was absolutely impossible, it was decided to put him to bed and apply massage treatment with most vigorous mercurial inunction. That was done, and he had another fit ten days after the treatment began, and a third a week later. A fourth occurred at the end of five weeks' severe treatment. It was obvious that his nutrition was markedly improving, although his epilepsy was more frequent. In the last fit a very interesting point was accidentally noticed. His brother was sitting close to him, reading aloud, and, noticing that something was happening, he thought if he continued to read aloud the fit would be arrested. He did so, and the patient never lost consciousness; he heard the reading perfectly well, but could not understand a word of it. He was brought to London on account of the recurrence of the epilepsy, and saw Dr. Russell, and it was considered advisable to explore the case at once. In connection with the penultimate attack, the patient said that when he felt it coming on he tried to go out of the room, and then felt that the right side of his face was drawn. That was the only motor spasm recorded. He (Sir Victor) explored the foot of the ascending frontal gyrus, and found a minute gumma, $\frac{1}{4}$ in. long, surrounded by a broad zone of hyperæmia, and the whole of the ascending frontal, superior frontal, and ascending gyrus filled with pachymeningitis of a most acute type. He excised the gumma, and the wound was already healed and the man seemed well. That was a clear instance of a gumma growing under the most active treatment. Surely the lesson to be drawn from such cases was, that in regard to the cases which got well there was no proof that they ever had gumma at all—they might have been cases of pachymeningitis. There was a much more favourable outlook in cases of pachymeningitis than in cases of gumma. But if after thorough mercurial inunction for five or six weeks the case continued to be localised, the safest course was that mentioned by Dr. Collier—exploration.

Dr. PURVES STEWART said he thought all were in agreement in regard to the main point raised by Dr. Collier, but there were other lesions of intracranial syphilis which did clear up under antisyphilitic treatment, and an important point on which he had hoped to have heard Dr. Collier's opinion was as to how long one ought to persist with antisyphilitic treatment in cases which appeared to be doing well. At first sight, the answer might seem to be: Go on until the symptoms stop. But such an answer was fallacious in two respects. First, the treatment might be persisted in too long. The patient's focal symptoms might never clear up; and this was readily understood because even after the removal of an active syphilitic growth by mercury and iodide of potassium a certain amount of structural damage might be left behind which might never be removed by any amount of treatment. Mercury and iodides could never remove the fibrosed tissue, nor restore sclerosed tracts, nor regenerate nerve-cells. But, on the other hand, the treatment might not be carried on long enough. Treatment might be stopped when the symptoms subsided, and yet there might be syphilitic involvement of a part which did not cause focal symptoms, and if, later, the disease extended to a part which did produce symptoms, there would be cause for regret that the treatment had not gone on long enough. There should therefore be some criterion as to the duration of treatment other than the patient's signs and symptoms; and he suggested that an important diagnostic point was the condition of the cerebro-spinal fluid. It was known that active syphilitic lesions were accompanied by well-marked lymphocytosis, and that as an intracranial syphilitic lesion subsided the lymphocytosis diminished and ultimately disappeared. Therefore he suggested that treatment should be continued until the cerebro-spinal fluid became normal, the fluid being examined at regular intervals, even after apparent cure. The reappearance of lymphocytosis should be an indication for the resumption of antisyphilitic remedies.

Dr. FARQUHAR BUZZARD said that one or two important questions had just been discussed, but they required a little further analysis. He understood

Dr. Collier to say that those cases which were most easily recognisable were those in which antisyphilitic treatment had the least result. That might be a true observation of cases seen in the wards of a hospital, because cases of doubtful origin were often admitted into the wards. In the out-patient department there was a considerable number of cases in which one had no hesitation in diagnosing a syphilitic lesion, generally gumma of the cortex, and in which the result of antisyphilitic treatment was that they got perfectly well. He could recall several such cases. The cases about which there was doubt were those which were admitted into the hospital. Therefore he did not agree with the general statement that the easily recognisable cases were those which required most early operative treatment. In reference to Sir Victor Horsley's point concerning the alteration in symptoms, what alteration was one to expect in a case which was having epileptic fits as the result of antisyphilitic treatment? Such patients might improve in health, might lose their vomiting and headache, and yet the epileptic fits might persist. Was that a reason for removing the focus, which might be a healed scar of the disease? If the object of surgery in such a case was to remove the only remaining symptom, the epilepsy, would that result be attained? Was is not rather the removal of one scar and the substitution of another? He thought they should be guided by the result of experience in removing scar tissue for the treatment of epilepsy, a procedure which had proved a failure in practice. With regard to the diffuse syphilitic cases which resulted in acute hydrocephalus, he did not altogether agree in thinking that many cases of acute hydrocephalus due to basal syphilitic meningitis were cured by antisyphilitic treatment. In those cases the syphilitic process might be stopped, as he had seen several times in the post-mortem room, and yet the hydrocephalus not only remained, but became progressive and killed the patient. If surgery could provide some means of overcoming the hydrocephalus when the actual syphilitic disease had been arrested it would bring in a very useful remedy.

Dr. COLLIER, in reply, said Sir Victor Horsley stated that pachymeningitis was one of the causes of the symptoms of cerebral syphilis, but he, Dr. Collier, had not come across a case of syphilitic pachymeningitis of such extent as to produce the symptoms of cerebral tumour. If so, it would come under the heading of meningeal gumma rather than tumour. Dr. Purves Stewart asked how long treatment should be carried on, and his reply would be that the treatment should be continued as long as the symptoms were disappearing, and that the case should be subsequently treated as an ordinary case of syphilis, *i.e.*, cessation of treatment for periods, with good feeding, the periods getting longer and longer. He did not think there was much difficulty in arranging such treatment, which accorded with the best results and with common sense. There were very grave difficulties about the diagnosis of the cerebro-spinal fluid. Private patients would naturally object to being periodically punctured to see whether or not they should have antisyphilitic treatment; moreover, he was not fully convinced that the condition of the cerebro-spinal fluid was an absolute indication. If the gumma were far removed from the cerebro-spinal fluid, he did not think that fluid would of necessity show changes sufficiently strong to go upon. Dr. Buzzard had misunderstood him a little on two points. He (Dr. Collier) agreed that there were many cases which got well under anti-syphilitic treatment. His point was that the cases which did not get well were rather among the cases of slow onset and with localising symptoms than among the acute fulminating cases, which he attributed rather to a condition of acute hydrocephalus than to the presence of a gumma. That hydrocephalus was undiagnosable, the clinical condition being exactly like that of non-localisable cerebral tumour. He thought Dr. Buzzard believed him to have said that that hydrocephalus occurred in basal syphilitic cases. In the two cases above referred to the lesion was confined to the ependyma, and it was a slight lesion.

The Nervous System of a Dog, which suffered from Ataxia and Involuntary Movements.

By F. E. Batten, M.D., and Gordon Holmes, M.D.

White bull terrier—healthy till fourteen months old—failure of eyesight—became dull—unsteady in gait—spasmodic movements of limbs—progressive deterioration. Killed when fifteen months old. Microscopical examination: Marked perivascular infiltration, infiltration of brain tissue; the brain is more affected than the cerebellum or medulla, and the medulla more than the spinal cord. The cell changes are most marked in the cells of the cortex. There is considerable degeneration of the cortico-spinal tracts.

The case is that of a white bull terrier, born in July, 1906. He was healthy till September, 1907, when his owner noticed that the dog's eyesight was defective and he was becoming dull. Mr. Bower, who saw him on September 5, stated that the dog had chorea or some form of brain derangement. There was no acute onset and the dog was not known to have had distemper. On September 10 he came under the care of Mr. Hobday, and although he improved to a certain extent in his general condition he slowly and steadily deteriorated.

On examination on October 10 the dog was in good condition, well nourished, and had a good coat; he could take his food well. When left alone the dog walked round the stable in an aimless manner, the head bent down. He did not seem to see, and in walking round the stable was guided by the wall. When he came to a corner his progress was arrested and he would apparently have remained standing in that position for an indefinite time unless his head was turned out, when he again went on his peregrination round the room. He walked on a very wide base in an ataxic manner, and had frequent sharp contractions of both the fore and hind limbs. He was easily upset by a tap on the buttock; he could, however, get up from the floor without help. There was no rigidity of the legs and all movements were capable of being performed. All the reflexes were brisk. His sense of smell was deficient; he would, however, eat up any food which was placed on the ground; if, however, it was in a bowl, he would push the bowl along the ground, and would only eat up the food if his nose were raised and put inside the bowl. The dog did not seem to hear, but Mr. Hobday states that white bull terriers are not infrequently congenitally deaf. The dog appeared to be quite blind. The pupils were large, but reacted to light. On examination of the fundus it appeared normal. After examination the dog was killed and the post-mortem performed by Dr. Holmes, and the following is the report of the pathological condition found:

No pathological change was visible to the naked eye in the central nervous system either at the time of the autopsy or when it was cut up after hardening in a 10 per cent. formalin solution. Marked changes were, however, found in sections taken from the different regions of the forebrain, brain-stem, and spinal cord. They were most marked in the forebrain, and were the same and varied only slightly in intensity in all the portions of it which were examined; they were, however, somewhat greater in the grey than in the white matter. The most striking change was the presence of a large amount of perivascular cell infiltration. In many places these cells were limited to the adventitial sheaths and the perivascular spaces of the vessels, but in other places they broke into and infiltrated the surrounding brain tissue; and, finally, here and there the tissue is infiltrated by diffuse collections of cells not in the immediate neighbourhood of vessels. Apart from this cell infiltration there was very little evidence of disease of the vessel-walls; at the most there is only a slight increase of the endothelial nuclei. A few infiltrating cells often surrounded the larger nerve-cells of the cortex, but they were then generally degenerating. The cell infiltration was not, as a rule, so compact in the nervous tissue as in the perivascular spaces. Similar collections of cells are seen in the soft membranes, but only in the immediate neighbourhood of the cortex; they are found chiefly around the vessels, but in places also in the loose tissue of the meninges.

The majority of these infiltrating cells are lymphocytes, each consists merely of a small round nucleus rich in chromatin, with little or no cytoplasm around it. A small number of plasma cells are also found, especially around smaller vessels where there is not yet a large collection of cells ; their nuclei are similar to those of the lymphocytes, but they are surrounded by considerably more protoplasm. In addition to these infiltrating cells there is some proliferation of the cells of the adventitial sheaths of the vessels, and of the neuroglial nuclei in the foci, in which there has been much cell infiltration and destruction of tissue.

In the pons and medulla oblongata similar changes are found, but they are less intense. Here, too, the grey matter is more affected than the white, especially that in the neighbourhood of the fourth ventricle. There is very little disease in the cerebellum ; in the white matter collections of small round-cells surround many of the vessels, and in the cortex there are a few irregular foci in which the tissue is infiltrated by similar cells.

In the spinal cord there is practically no disease of the white matter, and in the grey matter there is only a very slight amount of perivascular cell infiltration, and here and there a small focus in which the tissue is infiltrated by similar cells.

No definite change could be found in the nerve-cells of the spinal cord, and even in the medulla and pons there was remarkably little change in the cells considering the intensity of the disease of the vascular and interstitial tissues. In the neighbourhood of foci of intense round-cell infiltration there was generally some disintegration of the tigroid. No definite changes could be recognised in the nerve-cells of the cerebellum. A considerable number of the cortical cells were destroyed in the patches of round-cell infiltration ; in some of these the remains of cells can be seen surrounded by nuclei which seem to act as neurophages. As it is in the deeper layers of the cortex that the disease is generally situated it is the cells of these layers which have suffered the most severely. Where the cortex is not infiltrated in this way there is but little visible alteration in the cells ; in some there has been more or less, but usually only partial disintegration of the tigroid. In many places apparently normal cells are seen lying along a vessel which is surrounded by a large amount of perivascular cell infiltration or on the border of a patch of disease. Here and there are cell changes suggestive of acuter disease, generally in the form of shrunken cells which stain very intensely and diffusely, and in which the nucleus is scarcely visible. A few swollen cells in definite chromatolysis are also found.

The Marchi method reveals an enormous amount of degeneration of the myelinated fibres of the forebrain. Some of this degeneration is evidently of considerable age, as its fatty products, which are stained black by the osmic acid, are in places collected into large masses, and some of it has evidently already disappeared. It was chiefly the fibres of the white matter which were affected ; relatively few degenerated fibres are found in the cortex, but this is probably due to the degeneration products having been already absorbed from here.

In the brain-stem there is marked degeneration of the pyramidal tracts, and degenerated fibres are also found in some of the bundles which spring from its grey matter, as in the dorsal longitudinal bundles and in the vestibulo-spinal tracts.

In the spinal cord, too, it is chiefly the cortico-spinal tracts which are affected, but there is also a little diffuse degeneration in the rest of the ventro-lateral columns. This degeneration diminishes caudal-wards ; it probably represents affection of the fibres which descend to the cord from higher centres ; probably none of the proprio-spinal fibres are degenerated. In the lower segments there is slight degeneration of some of the dorsal root fibres, and, owing to this, a little diffuse degeneration ascending through the dorsal columns. There is no evidence of fibre degeneration in the grey matter or in the ventral spinal roots.

These changes indicate the existence of a chronic inflammatory process which has evidently affected the central nervous system through the blood-vessels, or through their adventitial or perivascular lymphatic spaces. We have been unable to discover the causal factor of this inflammation, but the changes in the nervous tissue itself are so slight that it may be with more probability attributed to the action of toxins circulating in the blood or lymph than to a direct infection of the brain itself.

These pathological changes bear a certain amount of resemblance to those which are found in the nervous system in general paralysis of the insane, in which one of the most striking features is the infiltration of the perivascular spaces by lymphocytes and plasma-cells. Dr. Mott has described somewhat similar changes in the nervous system in chronic trypanosome infection, as in sleeping sickness in man and in dourine, or *mal de coit*, of horses, and in both of these diseases he believes the changes are due to a chronic infection of the lymphatics of the nervous system.

Examinations of the nervous system of dogs which have had canine chorea in its more typical forms have been made by one of us, and the same perivascular implication and degeneration of the myelin above described has been present also in these cases. It would seem, therefore, justifiable to assume that the disease from which this animal was suffering was chorea, although it cannot be held to be proved that such was the case. Numerous clinical types of chorea in the dog may be described. There are those cases in which involuntary rhythmical movements of the limbs are the most striking feature; other cases in which paraplegia, more or less complete, is the leading feature; other cases in which ataxia and circus movements are marked, and again other cases in which the mental symptoms are the most striking.

The present case would seem to belong to the last class.

DISCUSSION.

The PRESIDENT said the last bull terrier he saw was deaf to all forms of test which he applied.

Dr. FERRIER asked whether it was a case of ordinary chorea in dogs.

Dr. PURVES STEWART asked whether Dr. Batten associated deafness in bull terriers with the presence of adenoids. One was familiar with the snoring respiration of those dogs, and there might possibly be some causal connection between the conditions.

Sir VICTOR HORSLEY, referring to the question just asked, said it might safely be inferred that Dr. Batten had not examined the dog's post-nasal space with his finger. He had often seen perivascular lesions in chorea in dogs, but the symptoms described were extremely characteristic of rabies, as well as of chorea.

A Note upon the Symptomatology of Tumours growing in the Fourth Ventricle.

By T. GRAINGER STEWART, M.B.

THE symptomatology of tumours growing in the fourth ventricle is both complex and indefinite. The situation of the fourth ventricle and its relationship to surrounding parts are such that any tumour originating in it is liable to interfere with the functions of the cerebellum, pons and medulla by direct pressure on these structures, and further, by blocking the intraventricular system, to give rise to internal hydrocephalus. In Germany the occurrence of cysticercus in the fourth ventricle is by no means rare, and numerous cases have been collected. Stern[1] has recorded 4 cases of his own and has collected 68 cases from the literature. From the study of these cases a clinical picture has been evolved, which differs, however, in many respects from that found in cases of intraventricular tumour.

Through the kindness of Sir William Gowers, Dr. Ferrier, and Dr. Risien Russell, I am enabled to recount the clinical history and pathological findings in three cases of tumour of the fourth ventricle which were under their care in the National Hospital, Queen Square. The notes of the first and second cases, taken by Dr. S. A. K. Wilson, and those of the third, taken by Dr. George Hall, have been briefly abstracted.

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[1] *Zeitschr. f. klin. Med.*, Berlin, 1907, lxi., p. 64.

FIG. 1.

Dilatation of upper part of the fourth ventricle and upper end of the tumour.

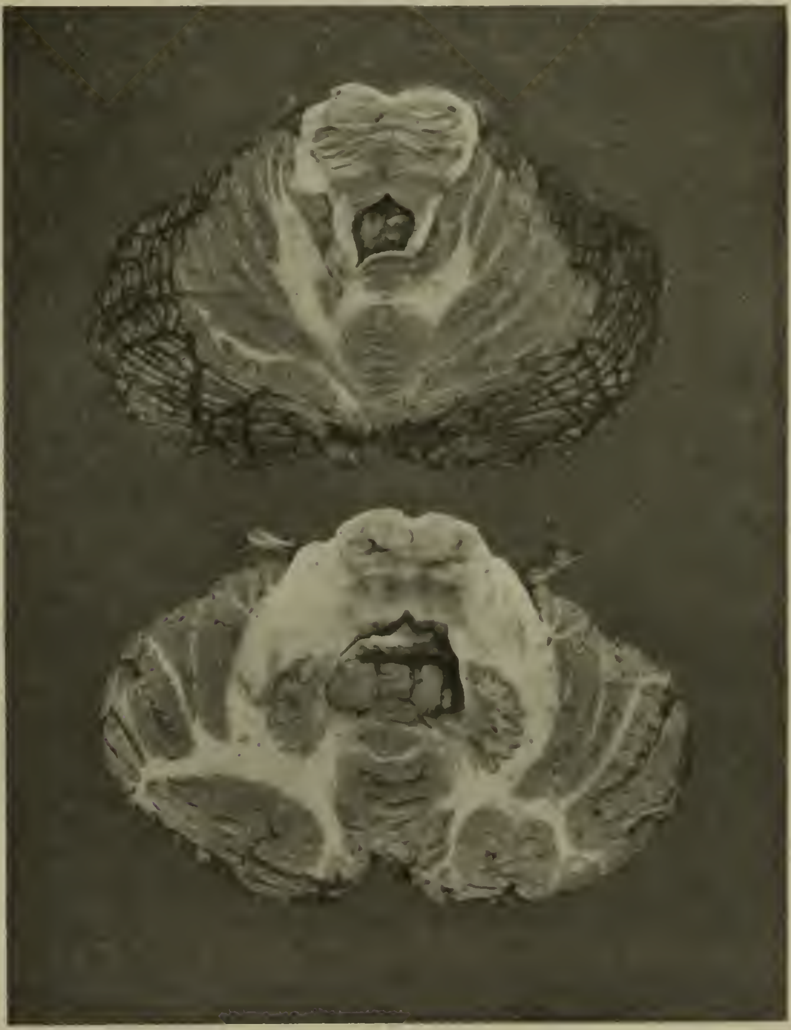


FIG. 2.

Growth attached to the ventricular wall.

Case I. Angio-sarcoma of the Fourth Ventricle (figs. 1 and 2).—W.H.P., male, aged 36, was admitted to the National Hospital, under the care of Sir William Gowers, in September, 1906.

Family History and Previous Health.—Unimportant.

Present Illness.—In 1904 he complained of slight pain and stiffness on both sides of his neck. In March, 1906 (five months before admission), he began to suffer from headache, vomiting, and attacks of giddiness. In August, 1906 (six weeks before admission), he noticed that he saw double when he looked to the right. During the two years he occasionally suffered from unsteadiness in walking.

State on Admission.—Mental condition excellent.

Cranial Nerves.—(1) Unaffected. (2) Well-marked optic neuritis in both eyes. (3) (4) (6) No affection of the pupils or of the muscles supplied by the third and fourth nerves. There was paralysis of the right external rectus and slight weakness of the left; diplopia on looking to the right. Nystagmus was present on conjugate lateral movement to either side. (5) (7) (8) (9) (10) (11) (12) Unaffected.

Motor System.—Normal. Gait natural.

Sensory System.—Normal.

Reflexes.—Deep, brisk on both sides. Superficial and plantar reflexes normal.

There was no evidence of organic disease of any of the visceral organs, but while in hospital small quantities of sugar were occasionally found in the urine.

At the post-mortem examination a tumour was found occupying the fourth ventricle, which was distended by the growth. The tumour was attached in places to the wall of the ventricle, from which it seemed to grow. There was secondary distension of the third and lateral ventricles and flattening of the cerebral convolutions. The growth had invaded the floor of the fourth ventricle in the region of the sixth nuclei, that on the right side being softened. Microscopically the growth was found to be an angio-sarcoma.

Case II. Tumour of the Choroid Plexus of the Fourth Ventricle, with secondary growths on the Spinal Cord.—A. C., male, aged 22, admitted to the National Hospital, under the care of Dr. Risien Russell, November, 1906.

Previous Health and Family History.—Unimportant.

Present Illness.—Five months before admission he complained of occasional dimness of vision in the right eye and, later, in the left. Two months later his gait become unsteady, and this was followed by gradual failure of vision. He had never vomited and had not suffered from any severe headache.

On Admission.—Mental condition was excellent.

Cranial Nerves.—(2) There was well-marked optic neuritis in both eyes. Vision was $\frac{3}{60}$ in right and $\frac{3}{36}$ in left eye. (3) (4) (6) Pupils were equal and reacted normally. Coarse nystagmus on conjugate lateral movements of the eyes to either side. Ocular movements good. (7) Slight weakness of the left seventh nerve. Other cranial nerves were normal.

Motor System.—Slight incoördination on the right side. Gait slightly ataxic.

Sensory System.—Normal.

Reflexes.—Deep; brisk and equal on the two sides. Superficial and plantar reflexes normal.

While in hospital his general symptoms increased, and the physical signs pointed to an extension of the growth into the right lateral lobe of the cerebellum.

November 27, 1906. Operation by Sir Victor Horsley. The right cerebellar region was explored, and some tumour removed from deep in the right lateral lobe.

December 4, 1906. Patient died from respiratory failure.

Autopsy.—Brain and spinal cord only. Dilatation of the lateral ventricles, third ventricle, and aqueduct of Sylvius. Flattening of the cerebral convolutions. No evidence of disease of the choroid plexus of the lateral ventricles. Operative destruction of the right lateral lobe of the cerebellum along the line of the great horizontal fissure. A large dark red growth was found lying in the fourth ventricle, which was distended by the growth. In the main the growth lay completely inside the ventricle, and was only attached in its upper part to the anterior wall of the ventricle; lower down it was attached to the wall all round, except in the left posterior corner, and it infiltrated the right lateral lobe of the cerebellum. In places there was softening of the walls of the ventricle round the tumour. The lower portion lay free in the ventricle and lateral recesses. The pons was flattened, and the medulla was much twisted and compressed by the growth.

Several small greyish nodules were seen on the surface of the spinal cord lying in or under the arachnoid. Their distribution was as follows:—

(1) On the anterior surface of the third cervical segment of the cord to the right of the median fissure.

(2) (3) (4) In the angles formed by the third, fifth and sixth left posterior dorsal roots.

(5) On the anterior surface of the ninth dorsal segment.

(6) In the junction between the first lumbar posterior root and the cord on the left side.

(7) On the eleventh dorsal posterior root about ½ in. from its exit from the cord.

Microscopical examination showed the growth to be a tumour of the choroid plexus (fig. 3). In character it was a typical papilloma, papillæ of fine connective tissue and blood-vessels being surrounded by a single layer of cubical or columnal-shaped cells, with oval nuclei placed towards the base of the cell. The secondary deposits on the cord and spinal roots were of the same character, and lay between the arachnoid and the pia.

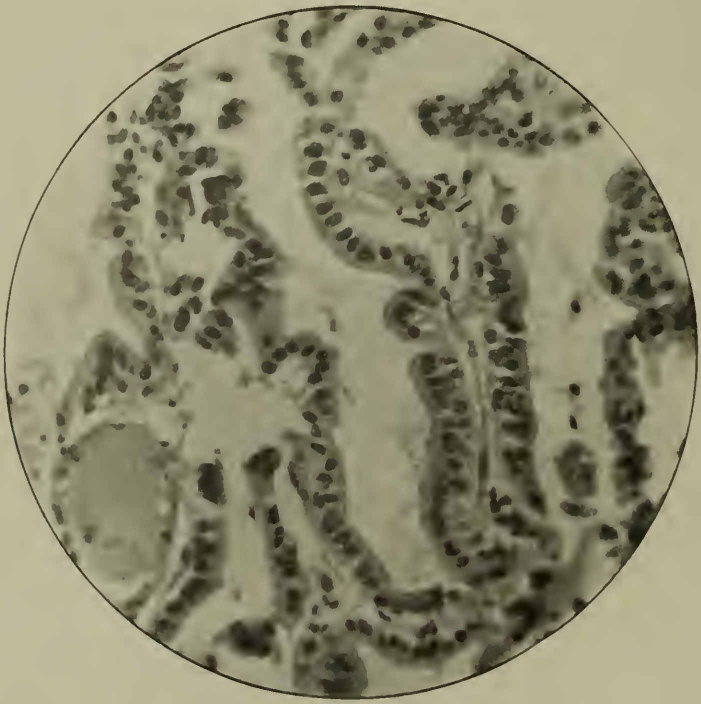


FIG. 3.
Tumour of choroid plexus (high power).

Case III. Tumour of the Choroid Plexus of the Fourth Ventricle.—A.N.T., female, aged 43. Admitted to the National Hospital under the care of Dr. Ferrier, February, 1907.

Family History and Previous Health.—Good.

Present Illness.—Two years before admission she began to suffer from headache, vomiting, and attacks of giddiness, especially when walking or moving about.

On Admission.—Mental condition excellent.

Cranial Nerves.—(2) Optic neuritis in the left eye only. (3) (4) (6) Left pupil slightly larger than the right, but both reacted normally. Slight nystagmus on looking to either side and weakness of extreme conjugate lateral movements. (5) Slight loss of sensation over the right fifth distribution. (7) Slight weakness of the right lower face. (8) (9) (10) (11) (12) Normal.

Motor System.—Nothing abnormal except unsteadiness in walking.

Sensory System.—Normal.

Reflexes.—Deep, brisk. Superficial and plantar reflexes normal.

Visceral Organs.—Healthy. The patient died from pneumonia some weeks later.

The *autopsy* revealed flattening of the cerebral convolutions and a considerable degree of internal hydrocephalus and dilatation of the aqueduct of Sylvius. A tumour was found lying in the lower portion of the fourth ventricle and protruding externally between the cerebellum, pons and medulla into the posterior system (figs. 4—10). The tumour was of a dark brown colour, and lay within the ventricle, which was distended by the growth. It was firmly attached to the choroid plexus, from which it grew, but it did not infiltrate the walls of the ventricle. It measured, in its largest part, 2·75 cm. in diameter and completely filled up the ventricle. The medulla was much flattened and the pons slightly compressed. The right fifth nerve was enlarged as it emerged from the pons. Spinal cord and membranes normal. Microscopically the tumour in the fourth ventricle was found to grow from the choroid plexus and to be of similar structure to that described in Case I. The tumour in the right fifth nerve was limited to the glial portion of the nerve and consisted of spindle-shaped cells with oval nuclei extending along the vessels.

Remarks.—From these cases, and from the records of published cases, it would appear that the general symptoms—headache, often occipital in position, vomiting and giddiness—are early and more or less constant. Optic neuritis may develop soon or late; its commencement is, as a rule, sudden and its progress is rapid. Loss of vision may ensue early, probably on account of the dilatation of the third ventricle causing direct pressure upon the optic chiasma. Giddiness is general in character and not associated with auditory phenomena. Mental changes are rarely in evidence until the terminal stages of the disease.

Despite the severity of the general symptoms, local signs are strikingly in abeyance. The examination of the cranial nerves reveals the following signs: (*a*) nystagmus on lateral deviation of the eyes to either side, similar in character and degree; (*b*) weakness, often slight, of conjugate movements of the eyes to either side: (*c*) paresis of varying degree of both external recti; (*d*) slight bilateral weakness of the lower facial muscles.

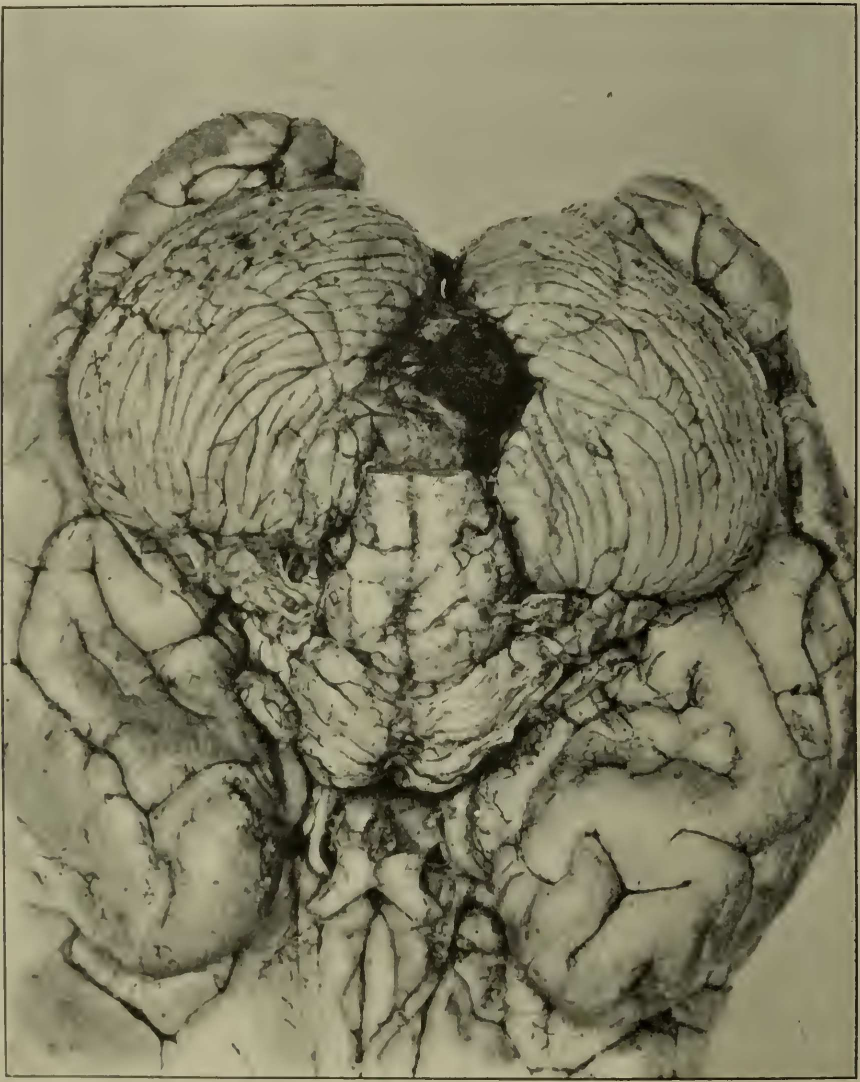


FIG. 4.

Tumour of choroid plexus, protruding between cerebellum, pons, and medulla. Serial sections of the tumour shown in figs. 5-10. These show the comparison of the pons and medulla.

The absence of signs referred to the other cranial nerves is striking and significant. It is true that inequality of the pupils is frequently observed, but this is, as a rule, temporary and variable. Paralysis of the third nerve with loss of the pupillary light reaction only occurs when grave secondary complications have developed. In the terminal stages of these cases death results from pressure upon the medulla, owing to the formation of a pressure cone within the foramen magnum, which causes respiratory paralysis.

Motor System.—Some degree of hyper-tonicity with a tendency to the development of clonus is not uncommon, and may be associated with a slight and inconstant instability of gait. This indeterminate condition, which suggests the probably early onset of definite spasticity and incoördination, may, however, exist for months. When definite spasticity or persistent incoördination are present they indicate respectively implication of the pons or cerebellum. As a rule there is no demonstrable paresis.

Fig. 5.

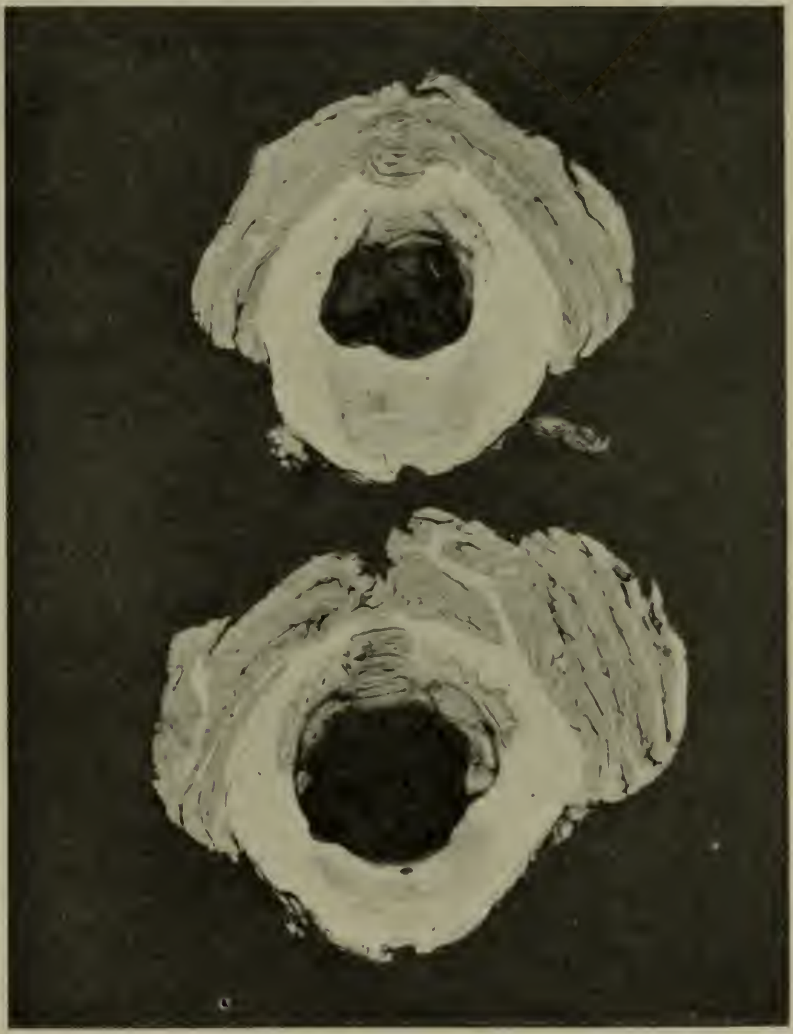


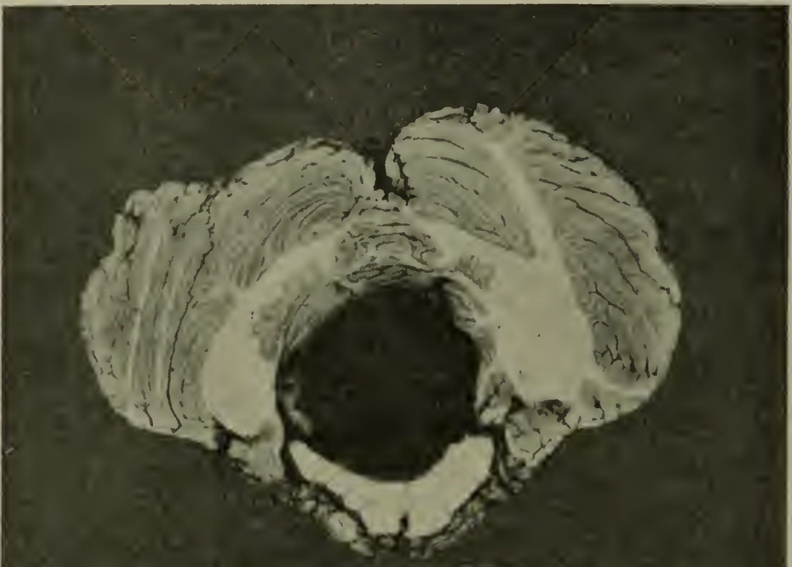
Fig. 6.

Sensory System.—Sensibility is not affected.

Reflexes.—The deep reflexes are, as a rule, brisk or exaggerated, but equally on the two sides, and this increase may not be accompanied by any change in the superficial or plantar reflexes.

The absence of definite spasticity, of paresis, and of changes in the reflexes in cases which at autopsy show not only internal hydrocephalus but flattening and distortion of the pons and medulla, seems at first sight incredible. It is, however, well recognised that the functions of the cerebrum, pons, and medulla may remain intact for long periods in such cases, provided that the increase in pressure has been sufficiently gradual to permit the circulation in these to adapt itself to increased tension.

Fig. 7.



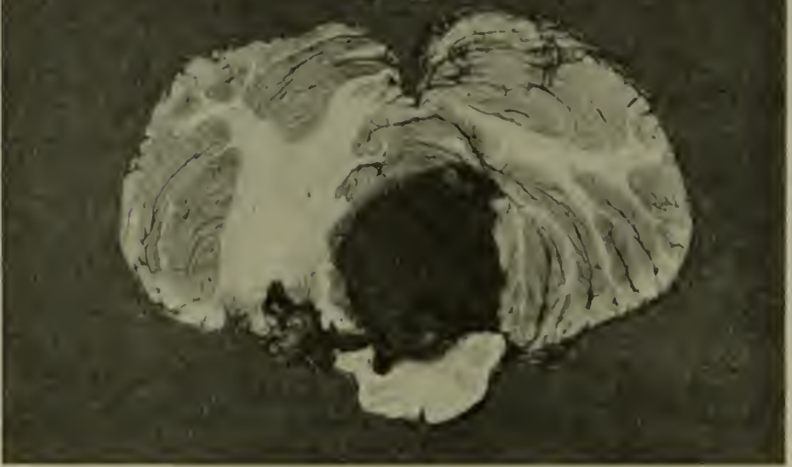
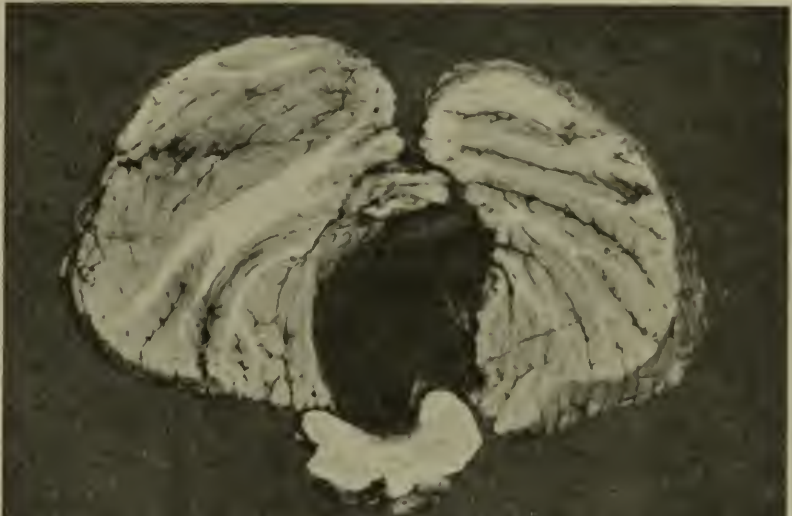


Fig. 8.

It is of interest that in one of the cases traces of sugar were occasionally found in the urine.

The chief points of distinction between the symptomatology of cysticercus and tumour of the fourth ventricle are as follows: In cases of cysticercus—(*a*) The long duration of many of the cases without definite signs; (*b*) the sudden onset of the attacks of headache, vomiting and giddiness; (*c*) the association of these attacks with sudden movements of the head; (*d*) the long intermissions with complete freedom from all symptoms; (*e*) the more frequent occurrence of glycosuria; (*f*) the late onset of optic neuritis; and (*g*) the frequency of sudden death.

FIG. 9.



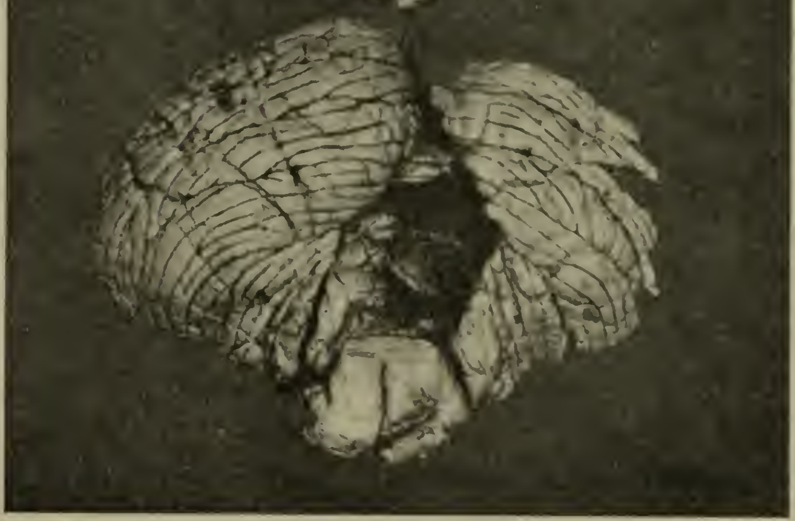


FIG. 10.

These differences may be explained by reference to the morbid anatomy of the two conditions. In cysticercus the cysts grow into the fourth ventricle, and therefore only affect the cerebellum and pons indirectly. They are often loosely attached to the ventricular walls, or may even hang free in the ventricular cavity, so that in some positions of the head they merely lie in the ventricle and do not block it, but any sudden movement of the head is liable to shift their position, and so cause temporary partial or complete obstruction of the intraventricular system with sudden onset of symptoms. Cysts are less likely to give rise to optic neuritis in the earlier stages as they do not obstruct the ventricle until they have attained a considerable size.

In tumours of the fourth ventricle the growth tends to gradually fill the ventricle, to grow upwards towards the Sylvian aqueduct and downwards into the lateral recesses and the posterior cistern. Tumours are also more likely to infiltrate the cerebellum, pons, and medulla, and as growth is slow and progressive so are the symptoms, save when there is hæmorrhage into the tumour. Optic neuritis will occur when the growth has attained sufficient size to raise the intracranial pressure. This may be early or late, depending on the seat and size of the growth.

In growths of the cerebellum invading the fourth ventricle, cerebellar symptoms are early phenomena, while, on the other hand, they are of late occurrence when a tumour of the ventricle extends secondarily into this organ.

The differential diagnosis of tumour in the fourth ventricle and cerebellar and pontine tumour must be made by the absence of definite pontine and cerebellar symptoms in cases which exhibit slight hypertonicity and ataxia, and from the presence of bilateral nystagmus and weakness of conjugate lateral movement of the eyes. The diagnosis of intraventricular growth will be further strengthened by the presence of sugar in the urine.

The pathological findings in the three cases are of interest, but especially the occurrence of secondary growths in the subarachnoid space of the spinal cord in the second case.

DISCUSSION.

Dr. FERRIER said the members were greatly indebted to Dr. Stewart for his excellent analysis of those cases, but they were too few to generalise from so as to arrive at the symptomatology of tumours of the fourth ventricle. He asked which, of all the symptoms he described, he regarded as being pathognomonic of tumour of the fourth ventricle, as, naturally, tumours of that region must cause great disturbance of function. He did not think that tumours of the fourth ventricle which he had seen and read of—not cysticerci—gave a symptomatology which was alike. Perhaps nystagmus and giddiness were notable, but he did not think any of them conformed to the syndrome described by Bruns, which he found in cysticerci of the fourth ventricle, and he noted the extraordinary tendency to giddiness and falling on the slightest movement of the head, so that a patient with that disease walked with the greatest circumspection, and avoided moving his head. Also, there was sugar in the urine, but in only one of Dr. Stewart's cases was sugar found. If it had been present in all it would have helped to differentiate more clearly such tumours from those in the corpora quadrigemina or cerebellum.

Dr. F. E. BATTEN said he had had a comparatively small experience of tumours of the fourth ventricle, but they seemed to him to give rise to very little in the way of symptoms. The case of the kind which he remembered best was that of a boy, who was taken ill with vomiting about the middle of July. Vomiting was his only symptom. It came on acutely, and persisted in spite of treatment. Careful examination revealed no evidence of intracranial disease. Before he (Dr. Batten) saw the child, he had been seen by a surgeon on account of supposed abdominal obstruction. The surgeon negatived that. The vomiting persisted from the middle of July to the end of August, but never during that time did the patient develop any sign of intracranial disease. In the beginning of September, however, he began to develop bulbar symptoms, which rapidly progressed, and he died on September 7, a week after the onset of the bulbar palsy. A large tumour was found in the fourth ventricle. Yet for at least six weeks the only symptom was vomiting.

Dr. WILSON said one could not expect to have very much help in the early diagnosis of such cases, as was borne out by the narration of the cases by Dr. Grainger Stewart and Dr. Batten. He had seen a case of probably the same nature, in which the general symptoms—headache, vomiting, and optic neuritis—were intense, but the localising symptoms very slight. One of the cases referred to by Dr. Grainger Stewart presented just that problem in diagnosis. There was intense optic neuritis, but, at first at least, the only localising symptom, if it were such, was weakness of the right external rectus. Sir William Gowers had raised the question whether it was possible to diagnose a supra- (as opposed to an infra-) tentorial growth from weakness of the external rectus alone.

The PRESIDENT asked, in regard to the giddiness and unsteadiness on walking, whether one side was more affected than the other.

Dr. GRAINGER STEWART, in reply, said it was very difficult to say what symptom should be relied on to diagnose the tumour he had referred to; it was necessary to study the case as a whole. The absence of definite cerebellar symptoms was important, especially when taken in association with the lack of pontine symptoms, because, although the pons and medulla were subjected to an extreme degree of pressure, their functions, both pyramidal and sensory, were not obviously impaired. He believed that the nystagmus on lateral deviation of the eyes and associated weakness of conjugate lateral movements, equal on both sides, were important and valuable diagnostic signs. The nystagmus was present in the three cases reported, and also in some of the cases recorded in the literature. In the case referred to by Dr. Wilson the sixth nerve was affected on one side before the other, and was an early physical sign. The tumour had infiltrated the brain, and softening had taken place in the region of the right sixth; it was therefore a true localising sign. He believed that paralysis of the sixth nerve was too commonly regarded as being of no localising value. In answer to the President, except in the one case in which the tumour had infiltrated the right lobe of the cerebellum, the giddiness and staggering were not more marked on one side than on the other.

A Case of Tubercle of One Sixth Nucleus.

By E. FARQUHAR BUZZARD, M.D.

I HAVE to thank my colleague, Dr. Carr,, for kindly giving me the opportunity of seeing this case during life—the patient was under his care in the Royal Free Hospital—and also for allowing me to make an examination of the brain after death.

A woman, aged 40, was admitted into hospital on June 1, 1907, complaining of headache and giddiness during the previous three months, following on an attack of so-called influenza. Her previous history disclosed some thoracic tubercle in her teens and chronic pelvic inflammation about six years ago, for which she was operated on. Two years ago she had a perinephritic abscess, which was opened, but did not cease to discharge for many months. During the last six years she had had about eight fits of an epileptic character. The chief points in her physical condition on admission were (1) double optic neuritis, which progressed after admission and was about equal in the two eyes; (2) weakness of all the muscles supplied by the left facial nerve, which improved considerably before death, and (3) conjugate deviation of the eyes to the right, with inability to move them to the left of the middle line, all other ocular movements, including that of convergence, being perfect. This condition was present in a slight degree before admission and became more marked, no improvement ever taking place.

For a time the patient's general health improved and the headache was less severe under the exhibition of iodides and mercury, but about July 1 there was an exacerbation of her symptoms together with persistent vomiting, drowsiness and pain referred to the back. She became comatose and died on July 17.

The autopsy showed no naked-eye evidence of disease on the surface of the brain, but a well-marked spinal tubercular meningitis affecting chiefly the dorsal segments. After hardening, the brain was cut and a number of very small caseous masses were found in different parts of the cortex cerebri and cerebelli. In the pons a small caseous mass occupied the position of the left sixth nucleus and extended forward 1 cm. or 2 cm. under the floor of the fourth ventricle. Another tubercle was found in the roof of the ventricle and another near the ventral part of the median raphe.

The microscopical examination was conducted with a view to confirming the nature of the mass in the sixth nucleus, and secondly to tracing the degeneration above and below this mass. The slides show the mass occupying the position of the left sixth nucleus to be typically tubercular, with numerous giant-cells and commencing caseation. Sections treated by the Marchi method show recent degeneration in the posterior longitudinal bundles both above and below the sixth nucleus, but the following important point is to be noticed. The degeneration above the lesion of the left sixth nucleus is much more marked in the right than the left posterior longitudinal bundle, whereas the degeneration below the lesion is more marked in the left than the right posterior longitudinal bundle.

Unfortunately, by the accidental loss of a block, my highest sections do not reach the termination of these degenerated fibres in the third nucleus, but previous observations all go to prove that most of these do terminate in the lower part of the oculo-motor nucleus and do not pass direct into the third nerve. A point which is not settled is the question whether the fibres from the sixth nucleus cross to the opposite third nucleus, and, if so, when that crossing takes place. Bruce, in his case of bilateral lesion of the sixth nucleus, was unable to find any decussation at the level of the third nucleus, but refers to a possible infranuclear crossing, *i.e.*, fibres from one third nucleus leaving the brain by the opposite third nerve. My sections support the view that the fibres decussate at the level of the sixth nucleus to the opposite posterior longitudinal bundle. On the other hand, one has to remember that fibres from the left Deiters' nucleus would pass through the tubercle, and that they decussate at that level and pass up in the opposite posterior longitudinal bundle.

This case does not settle the question as to whether the connection between one sixth nucleus and the opposite third is performed by fibres originating in, or merely passing through, the region of the sixth nucleus.

If the latter is the case it may be that the fibres from Deiters' nucleus are concerned in the mechanism of conjugate deviation.

Sir VICTOR HORSLEY said there was no doubt the fibres referred to came from Deiters' nucleus, but there were fibres outside the posterior longitudinal bundle in the region of the reticular body, and those probably came from the roof nucleus. He wondered whether the tubercle in the roof of the fourth ventricle cut some fibres from the roof nucleus of the cerebellum. When he saw the specimen he felt sure there must be another lesion in the roof nucleus, although he had not seen the photograph. The communication was rather indirect than direct. Conjugate deviation of the eyes could occur from a lesion of Deiters' nucleus.

Neurological Section.

January 30, 1908.

Dr. CHARLES E. BEEVOR, President of the Section, in the Chair.

A Discussion on "Tics."

Opened by HENRY HEAD, M.D., F.R.S.

DIFFICULT as it is to define a tic, we are all conscious of what we mean by the name. A repeated blinking of the eyes, a sudden movement of the mouth, or a jerking of the head forms the recognised instances of what in the past has been called a habit spasm, but is better called a tic, for, as I shall show later, although the movement is habitual, it is not a spasm in the true sense of the word.

A tic is a coördinated, purposive movement of the voluntary type; but when we look round we see frequent instances of movements of this kind. A man with a high collar is not easy until he has moved his neck against its edge, a large proportion of women have a habit of jerking the hat into place by a sudden backward movement of the head. These may become tics, but are not of necessity tics, unless they are carried out apart from peripheral irritation. In order that the movement should be a tic, it must be performed when the external stimulus is no longer present. I know a lady who is in the habit of making jerking movements of her head to settle her hat; she twists her neck as if her collar were uncomfortable and repeatedly pulls up her gloves. These movements are a true tic because they are performed with equal frequency when she is not wearing a hat, when her neck is free, and she is without gloves. That is to say, in certain persons a movement which has become the habitual response to an external irritation may continue when the stimulus is no longer present.

Sometimes a tic may arise as an emotional expression. We all know the child who, when standing to be questioned, makes a rotatory movement of the shoulder, which is usually said to be a form of "fidgeting." Now this movement is one of the most characteristic tics which can occur in youth, and is evidently, at the beginning, nothing more than an emotional expression of uneasiness. A patient under my care developed a tic which consisted of a movement closely resembling the withdrawal of the head and shoulders of one who fears to receive a blow in the face—it was developed in consequence of much worry and official work, carried out under a chief who was bullying and abusive. Sometimes a tic arises as an associated habit. One of my patients is unable to think attentively without pulling her ear; and we all know the child who cannot answer a question without twisting his fingers or biting his nails. So long as these habits occur solely in conjunction with one particular condition, such as concentrated thought, they are not tics; but when they pass from their original association, to become definite movements arising without the original cause, they become tics. We may, then, define a tic as a coördinated purposive movement of the voluntary type, which may have arisen at first as a reaction to some external stimulus, as the expression of some emotion, or as an associated habit.

As soon as we analyse the cases which fall into this group, we find that the part played by volition in the production of the movements differs greatly. A woman who developed a winking movement of one eyelid during an attack of severe conjunctivitis still continues to make the movement, but she is entirely ignorant of any such habit. In the same way, most of those who blink their eyes in the familiar manner are not uniformly conscious of the movement. In such cases, the tic, which originally arose as a volitional movement, loses its association with ordinary consciousness and may become a habit, of which the patient may be to a great extent unconscious. Such movements may be spoken of as habit tics.

On the other hand, volition may play a preponderating part whenever the movement of a tic is carried out. The patient I show this evening has an overwhelming desire to rotate her head backwards and to the left. This she can control, but under ordinary circumstances the desire to make the movement is resisted for a short time only, then she rotates her head, and the desire is appeased for a time; it grows again, is at first resisted, and again becomes overwhelming. In the same way, a lady renowned for her beautiful teeth began to grind them, so that she chipped off small portions; she determines that she will not make such movements, but at last she yields and grinds her teeth, frequently producing severe injury to the enamel. When these paroxysms become frequent, they are followed by an intense misery that she had yielded to the passion she had determined to quell. Here, then, we find the full development of the mental aspect of a tic—the desire to make the movement, resisted at first, but at last overwhelming, the movement, and the subsequent misery. So great may this misery become that a patient may be thought to be suffering from melancholia, and the true nature of the condition overlooked. This patient one day saw a chair upset in her room, so that the back was broken across. This immediately suggested a broken tooth, and she could not rest until she had chipped off a visible portion from one of her teeth. This shows how closely some of these tics are allied to impulsive ideas. This group may be spoken of as tics of volition.

All true tics cease during sleep, and all can be controlled under exceptional conditions. It is not at all uncommon to find that during the consultation the patient shows no abnormal movements, and the patient I showed to-night is always perfectly still when one of the firm enters the room where she works.

All sufferers from tic have an unstable nervous system. Many of them are above the average in ability, but there is always something that betrays their want of balance. They are what the French call "déséquilibrés." In a vast number of cases there is a bad family history, and in one case under my care, the mother, a nervous woman, had a brother and four first cousins who stammered badly; the patient, a girl with a profound tic, had a brother who stammered and one who was normal as far as any obvious neurosis was concerned. The menopause is a not infrequent cause of the development of tic; and such movements are not uncommon amongst epileptics and high-grade imbeciles.

The movement of a tic is fundamentally different from that of chorea, for a tic is a repetitive voluntary movement which serves no direct object, whilst chorea consists of voluntary non-repetitive movements, misdirected towards the desired end. It is rare to find that an occupation cramp bears any relation to the tics—writers', piano-players', and typists' cramp occurs solely with one definite occupation; and the hand, that is unable to hold the pen, can hold the needle with perfect steadiness. But a tic may be occasionally of such a nature that it affects writing. A young woman under my care had an habitual movement which consisted of flexing the elbow and extending the wrist. This greatly interfered with her writing, but also prevented her from sewing and playing the piano; in this way it differed totally from a true occupation cramp.

Stammering has nothing to do with tics. It consists fundamentally of an attempt to articulate without phonating. But some people show a true tic of speech. There are patients who interrupt their conversation with a noise like that of a guinea-pig; if carefully observed it will be found that not infrequently these guinea-pig noises are continued when the patient is not speaking, and has no desire to enter the conversation.

The differential diagnosis between some hysterical manifestations and tics is occasionally extremely difficult. Sudden cures are familiar in hysterics, but unknown in tic. Moreover, an hysterical movement is always worse under observation; whereas a patient with tic will frequently control the movement entirely when under observation, to relapse into a storm of movements as soon as he is no longer strung up for examination. Moreover, the usual stigmata, such as tender points, globus, and paroxysmal manifestations, are remarkably rare amongst those who suffer from tic.

Before closing, I should like to remark on the use of the word "torticollis." Torticollis is no more a clinical diagnosis than paraplegia —it must be qualified by some word indicating the cause which underlies the movement of the head out of the middle line. Thus a large number of those cases which are usually spoken of as spasmodic torticollis are, in reality, instances of torticollis tic.

In conclusion, I should like to pay a tribute to the remarkable manner in which the French school have increased our knowledge of this subject, which has been so greatly neglected in this country until recently. They have made for us a path in which it is easy to walk; and anyone who will take the trouble to investigate his cases according to the methods advocated by the French observers will find how easy it is to confirm their observations.

Dr. Ormerod said that he thought the two classes of tics described by Dr. Head stood on different footings. In the first, the action, though at first voluntary, had become habitual, and was performed without annoyance to the patient or even without his knowledge. In the second the action was performed consciously, under the stress of an imperative idea, and gave rise to distress. Should the second be called a tic? Neither did he think that hysteria could be altogether discarded as a possible basis for tic. Actions resembling tic were not uncommon in hysteria. Again, since the subjects of tic were usually in some sense neuropaths, it might well be that in certain instances the nervous defect which lay at the root of this affection was hysteria.

Dr. JAMES COLLIER agreed with Dr. Head that the majority of "ticqueurs" do not suffer with hysterical manifestations. He considered that the recurring laryngeal noises and other similar phenomena which are prominent symptoms in some cases of hysteria should not be considered as varieties of tic, since such symptoms are much more amenable to impressive treatment than are the tics, and may disappear suddenly as the result of impressive treatment, and may reappear after very long periods, suddenly and in severe form, with a recrudescence of other hysterical manifestations. Such events are exceptional in the clinical history of the tics, and the clinical aspects of these two classes of cases are quite distinct. While he was convinced of the psychomotor origin of the tics and of torticollis, and of the close affinity between these maladies, yet he did not see that any useful purpose was served by including the majority of cases hitherto known as cases of spasmodic torticollis under the term "torticollis tic." He thought that the use of this term in this manner tended to confuse two groups of diseases that were clinically well distinguished. He preferred to use the term "torticollis tic" for a tic in which the movement was one of rotation and inclination of the head.

Dr. WILFRED HARRIS drew attention to the importance of the observation of the French neurologists on the frequency of some peripheral cause for the original development of the movement, which afterwards became insistent, stereotyped, and recurrent, as a tic, or habit spasm. He described a case of torticollis tic in a young lady, who first noticed the twitching of the head towards the left when sitting before her toilet mirror to do her hair. On examination the cause was found to be an amblyopic left eye. He further claimed the identity of mental tic, a form of obsession, with the second type of tics referred to by Dr. Head; whereas the purely motor tics are forms of recurrent habit spasm, not preceded by any volitional impulse to perform the movement. In the mental tics there is present the overmastering impulse to repeat the particular movement, which, when executed, is followed by a sensation of relief, if not shame and remorse. He quoted the case of a young clergyman, with a bad family history of neuropathy, who became obsessed with the idea of repeating headlines, phrases from newspaper articles, names over shops, poster headings, &c. The idea to continually repeat these words would haunt him with increasing force until he gave way to it, when he would rush to his room and there revel in a delirium of repetitions of the phrase, thirty or forty times over, after which would come relief.

Dr. Farquhar Buzzard, while admitting that a tic originated in most instances in a voluntary movement, drew attention to an exception to this rule. Occasionally one observed a tic develop from an attack of chorea. A boy, for instance, would have a severe bout of chorea, and would recover from it completely except for one movement, often a facial one, which would persist as a tic and might prove very difficult to get rid of. These cases were not very common, and it might be that they only occurred in ticqueurs, but they were interesting in that they seemed to show the possible birth of a tic from a pathological condition of the higher centres. Although the movements of chorea were not voluntary, yet they were very closely allied to voluntary movements and had been called "purposeless purposive movements" by Dr. Hughlings Jackson in order to emphasise this point of similarity. The origin of a tic from such a source should be remembered because the treatment of the choreic movements and that of the secondary tic were essentially different, and success with the latter might depend upon its early recognition.

Dr. Leonard Guthrie said: It seems generally agreed that tics are not spasms, although in practice it may be hard to tell the difference between them. Tics are psychomotor; spasms are merely motor reactions. A spasm is the motor result of local irritation somewhere in a spinal or bulbo-spinal arc, in a peripheral end organ or centre in the cord or bulb, or in centripetal or centrifugal nerve fibres. A spasm cannot be produced or controlled by act of will. It is non-purposive; the movements, even if more than one muscle group is affected, are not coördinated. It is not expressive of emotion, it is not preceded by an impulse to produce, is not followed by a sense of satisfaction. It ceases when the irritating cause which produced it is removed. In all these respects spasms differ from tics.

Tics are produced, and may be controlled or aborted, by act of will. They are elaborately coördinated movements—gestures expressive of defence or defiance, or of some kind of emotion; they are preceded by peremptory desire to perform them and are followed by a sense of satisfaction. They may persist long after their supposed local cause has been removed. They may seem purposive at first, but are really not adapted for any purpose whatever. They are only purposive in the sense that their performance is an end in itself. Tics are motor manifestations of psychical unrest or cortical instability.

The term *habit spasm* is an unfortunate synonym for tic. Tics are certainly not spasms, neither are they, strictly speaking, habits;

for habits are acquired by practice, but tics start ready made, however elaborate, intricate and difficult of imitation they may be. Habits, again, are unconsciously or semi-consciously practised. Unlike tics, they imply no conscious conflict between desire to perform and wish to restrain them. Yet, in time, in some cases at all events, the conflict ceases, although the motor manifestations persist.

Tics, then, do become habits or stereotyped acts, and recognition of the fact is an important clue to treatment.

Are tics, like spasms, actually caused by local and peripheral irritation? It seems more correct to regard them as suggested rather than caused by external stimuli. In tics "great events from little causes spring." The most trivial and passing local discomfort may suggest a tic, but it does not cause it in the sense that a facial spasm is caused by electrical stimulation of the facial nerve. Hence the accepted treatment of tics, which consists in searching for and removing every source of irritation, however slight it may be, is open to question.

The apparent success which sometimes attends correction of a minor error of refraction or operation for infinitesimal naso-pharyngeal disorders and so forth may be fallacious, for tics are variable; they come and go capriciously. One commonly gives way to another, and it is seldom that more than one tic, trick or antic is exhibited at the same time. After every conceivable alteration and repair has been effected, a child may cease to tic for a time. But the excitement of a party, a pantomime, or the worry of sums which will not come right is sufficient to renew all the tics with redoubled vigour. It is not contended, of course, that morbid conditions of eye, nose, and throat, &c., when sufficiently serious to cause ill-health and discomfort, should not be treated, but only that miniature affections of the kind should not be regarded as *veræ causæ* of tics, and crusades undertaken for their removal.

Tics bring motor manifestations of psychical irritability and unrest; it is of greater importance to treat the psychical condition than its motor manifestation. Children who suffer from tics are invariably neurotic, excitable, emotional, impressionable, prone to fret and worry, elated and depressed by turns. Their intellect is usually above the average, but they are readily exhausted mentally and physically. Some tic only when at school, and others only during the holidays.

In all cases rational treatment consists in securing peace and quiet for the child, protecting it from emotional excitement and mental overstrain. A simple natural country life is best for them.

So far as the motor side of tics is concerned, it should be remembered that the movements are due to uncontrollable impulses to perform them. This is so, at all events in early stages, and they are intensified by showing attention to them.

Hence, although they may be regarded as evidence of "volitional infirmity," it is inadvisable to try to increase the will power by exhorting the child to control itself, and by subjecting it to systematic drill and exercises. Such treatment only tends to floods of tears and protests and increased irritability. Children will worry incessantly over their inability to cure their "bad habits." When peace of mind is restored, the tics will usually disappear. Yet, as previously mentioned, the movements may persist as "habits," although they are no longer based on impulse. It is then that moral suasion, mirror drills and exercises are of value, as in cases of chorea, in which the movements continue long after the acute and uncontrollable stage of the disease has passed.

Neurological Section.

March 12, 1908.

Dr. Charles E. Beevor, President of the Section, in the Chair.

Hæmangiectatic Hypertrophy of the Foot, possibly of Spinal Origin.

By F. Parkes Weber, M.D.

The patient was a motor driver, aged 19, whose left foot was decidedly larger than his right foot, and of a red or bluish-red colour, as if turgid with blood. The skin over part of the foot, especially over the dorsum, was closely studded with small, projecting, bluish venous loops (varices), and so also, though in a lesser degree, was the skin over the knee-cap of the same extremity. The calf muscles and other muscles of the leg were about equally developed on the two sides, but there was considerable wasting of the left thigh and buttock and the left hip-joint was ankylosed. The two lower extremities were about equal in length. The knee-jerks and plantar reflexes were natural, and there was no ankle-clonus on either side. The pulsation in the dorsalis pedis artery was well felt in both feet. There was no anæsthesia to touch, pain, heat, or cold, and the reactions of the muscles to galvanism were normal. There was considerable kyphosis in the dorsal region of the spinal column. There was no evidence of any other disease in the thoracic or abdominal viscera or elsewhere in the body. Dr. Archibald D. Reid had kindly taken Röntgen photographs of the feet and hip-joints. They showed that the hypertrophy of the left foot was practically confined to the soft parts and that there was bony ankylosis of the left hip-joint (of doubtful origin). The history was that about two years ago the patient complained of pain in the back of the left thigh. He was at first treated for sciatica and was afterwards supposed to have hip disease and wore a Thomas's splint for eighteen months. The hæmangiectatic hypertrophy of the left foot and the wasting of the thigh muscles, &c., had developed during the last two years, but the kyphosis of the dorsal region had existed to some extent previously, though it seemed to have increased during the last two years. He had experienced no pain in connection with the changes in the lower extremity excepting the pain at the back of the thigh about two years ago. Dr. Weber had explained what he meant by "hæmangiectatic hypertrophy," congenital or acquired, in an article published in the *Medical Press*, March 4, 1908, p. 261.

Intermittent Claudication in a Lower Extremity (Angina pedis or Angina cruris) from Chronic Arteritis obliterans.

By F. Parkes Weber, M.D.

THE patient, a Russian Jew, aged 42, complained of cramp-like pains in the inner part of the sole of the left foot (muscles of the instep) or in the calf of the left leg, which always attacked him if he had to walk for three or four minutes and obliged him to rest a few minutes before going on. Pulsation was absent from the dorsalis pedis and tibialis postica arteries on the affected side. When the patient was examined lying down in bed very little difference between the two feet would be observed, but when the legs were allowed to hang down over the side of the bed the distal portion of the left foot became red and congested-looking, especially the fourth and fifth toes. If the patient then forcibly flexed and extended the ankle-joint a few times the skin of the foot in less than a minute would lose its congested look and become blanched. If muscular exertion (walking) were continued for three or four minutes the patient commenced to limp and had to rest on account of cramp-like pains in the muscles of the instep or the calf. If the foot were examined at the time of the cramp-like pains it would be found to appear pale, but not so white as it did after only a few movements. There was no history of syphilis or excess in alcohol. The affection had commenced gradually about five years ago with pain in the sole of the foot on walking, and though the patient had been threatened with local gangrene he had so far escaped, but the question of amputation, on account of pain and inability to walk, might have to be considered. Dr. Weber had described the case in full in the *Lancet*, January 18, 1908, p. 152.

The treatment had been by rest, local hot-air baths, iodipin, fibrolysin injections, &c. The local and general condition had improved somewhat under such treatment in the hospital.

DISCUSSION.

Dr. HEAD said that the only two cases of this condition he had seen were in Russian Jews, and he understood that all Dr. Weber's patients belonged to the same nationality. Many Russian Jews, he believed, had been infected with syphilis in infancy. This disease was said to be prevalent in Russia, and no precautions were taken to prevent its spread by means of drinking utensils. Moreover, the usual salutation, even between men, was a kiss. When a limb was amputated for claudication the arteries showed a condition compatible with the disease being caused by syphilis.

Sir WILLIAM GOWERS sent to the meeting a note of the following case of angina cruris, which was read by the Secretary: The patient was a clergyman, aged 50, of a gouty family; he had been rather prone to lumbago. Six months before I saw him he was suddenly seized with intense pain behind the right internal malleolus. It lasted only a minute, but was so acute as to cause him to shriek, to burst into perspiration and roll on the floor. A month later, he had a second attack quite similar. Each one seemed to make his legs weak for a day or two. After the second he rested in bed for a short time, but on getting about again he had a recurrence of the pain every two or three hours, especially in the night. His doctor gave him a daily dose of morphia, which prevented the pain or made it trifling, and kept him in bed for five weeks. He then went to the sea, and any occasional pain he had was slight. Meanwhile, however, he had developed other pains, more or less paroxysmal, although not so brief or intense as that behind the malleolus; some were felt on both sides of each foot, some in the thighs, and a sharp jumping pain was felt in each hand, in the hypothenar region and extending across the base of the palm to the thumb. I first saw him six months after the onset, which had occurred in June. There was nothing abnormal to be detected anywhere. The knee-jerks were a little active, but there was no clonus; sensation was normal and so were the plantar reflexes; no tenderness could be found. The spot to which he referred the pain corresponded precisely with the artery behind the malleolus, and the vessel on the right side seemed rather thicker and somewhat more tortuous than on the left. I was unable, then or afterwards, to learn anything of its condition during a paroxysm of pain. The patient averred that the agony was too great to let him feel it. I could not ascertain the state of pulsation from the medical attendant, because he was one of those practitioners who deem a physician a needless nuisance (so he told the patient), and I received no reply to a letter I wrote. After I saw him the patient had little pain for four months, then came a recurrence, the same in seat and in severity, but each paroxysm lasted longer, three or four minutes, and the pain was felt also in the left side of the heel. It recurred every five minutes for three or four hours, and left him again scarcely able to walk. After this he had a pain, described as more like rheumatism, in the front of the left thigh, starting from above the hip and passing down the outer part of the front of the thigh to near the knee. He also had an occasional sharp pain in front of each wrist. These ceased after a time, but the post-malleolar pain recurred occasionally in serial paroxysms, generally relieved by 1 gr. of morphia or some opium. In this way many months passed, during which he came to me two or three times. At last he had a blister over the seat of the pain, which seemed to be rendered much slighter, but more extensive. It spread to the heel, which became tender, and also to the right side of the foot, and even up the shin. But occasionally it was very intense at the old spot, and then made the skin tender, so that when lying he could not evert the foot on account of the pain caused by the tension at the spot. Towards the close of the second year from the onset the pain seemed to wear itself out, and I have heard nothing of the patient since. Of the effect of treatment I can say nothing, as the patient was seldom allowed to take more than a few doses of anything I ordered. The case corresponds closely in seat and character of the pain to those that have been described under the name "angina cruris," and I regret that it throws no light on the state of the artery, spasm of which has been alleged as the cause of the pain. As far as the associations and extension of the pain are concerned, the features seem rather opposed to the opinion.

Dr. WEBER, in reply, said he believed that after about the age of 50 the symptom-complex of intermittent claudication was not excessively rare in people of any race. He had seen ten cases of intermittent claudication or arteritis obliterans of the lower extremity in Russian Jews, and in some of them the symptoms of the disease had commenced considerably before the age of 50. He did not think the conditions of the arteries in question should be exclusively classed as syphilitic. As the changes were certainly not confined to the inner coat he preferred the term "arteritis obliterans" to "endarteritis obliterans." When examining an artery the seat of advanced arteritis obliterans one always found more or less vascularisation, and in some cases the remains of blood-clot. The final obliteration of the vascular channel was probably always due to thrombosis.

Two Cases of Cerebellar Ataxy.

By WILFRED HARRIS, M.D.

CASE I.

E. B., AN unmarried girl, aged 23, for the past two years has been becoming gradually unable to walk, until now, and for the past few months, she is quite unable to stand alone. During the same period her articulation has become slower, and she has lost partial control over her arms. Even so long as ten years ago she remembers her father calling her fidgety and shaky, though she states that she was perfectly able to walk then and to run as other children.

Family.—An elder sister (also shown) appears to be developing the same condition of ataxy, though in a much earlier stage. No other nervous disease in the family.

Present State.—She is quite unable to stand or walk, owing to wild ataxy of the legs. The arm movements show ataxy of the cerebellar type, the movement being wilder at the commencement, and becoming steadier as the goal is reached. There is no muscular wasting or anæsthesia or sphincter trouble; no nystagmus or optic atrophy. The deep reflexes are normal and plantar reflexes flexor. No pes cavus or scoliosis. The articulation is slow, resembling that of Friedreich's disease.

CASE II.

The sister of the above, sixteen months older, has noticed that for the past three months she has had slight difficulty in walking straight, in talking, and that she is especially liable to be worse at the end of the day or when she is tired. She has definite scoliosis, but no pes cavus. She is apt to stumble in her gait, and there is slight ataxy of the arms. The reflexes are all normal, and there is no nystagmus or affection of vision.

DISCUSSION.

Dr. GORDON HOLMES said such cases were very interesting, but the difficulty was to classify them with regard to the basis of the disease. He had recently looked through the literature of the so-called cerebellar ataxies, and in only a small proportion of the cases could any disease of the cerebellum be demonstrated, either macroscopically or microscopically, after death, in cases in which there had been definite cerebellar symptoms. A large number of them had been due to disease in the spinal cord, chiefly of the spinal or cerebellar systems. The well-known cases of Sanger Brown, afterwards worked out by Meyer and Barker, were in that category.

Dr. WILFRED HARRIS, in reply, said there was a difficulty in being at all certain about the pathology of such cases, but the symptoms in these two cases suggested to him primary cerebellar disease rather than spinal cerebellar, such as Dr. Gordon Holmes referred to. Sanger Brown's cases developed many more symptoms, such as optic atrophy, the Argyll-Robertson pupil, and mental deterioration, none of which were seen in the present cases. The responses were flexor, and there was no alteration in the deep reflexes, which was against any affection of the pyramidal tracts. There was a pure cerebellar syndrome, with the exception of nystagmus, which was completely absent. The condition might be primary cerebellar cortical atrophy. As Dr. Holmes had shown in a paper in *Brain*, it is difficult to distinguish between those groups clinically, although pathologically they might be utterly different.

Case of Peroneal Atrophy.

By Wilfred Harris, M.D.

A man, aged 43, for the past twenty years has noticed gradual alteration in the shape of his feet, especially the left, which has become so marked during the last twelve months that he is compelled to walk on the outside of his left foot, owing to pain caused by pressure on the ball of the foot. He is, moreover, liable to repeated painful cramps in the left calf.

Present State.—Extreme pes cavus of the left foot, the extensor tendons being remarkably retracted. Definite wasting of the anterior tibial muscles and peronei on the left side. On the right side the extensor tendons are much less retracted, and there is very slight pes cavus. All other muscles normal. Knee-jerks and right Achilles-jerk normal, but left Achilles-jerk absent. No anæsthesia or analgesia. Pupils normal. Peroneal nerves appear normal in size.

Dr. Harris thought it was a chronic degenerative neuritis, possibly of the hypertrophic type, which had been frequently described in France. It dated back twenty years and was still progressing. There was none of the evidence of anæsthesia or the pupil symptoms described by the French. He proposed to afford him some relief by tenotomy.

Case of Tremor of the Right Arm associated with Epilepsy.[1]

By F. E. Batten, M.D.

R. L., aged 23, was a silver polisher, for which she used the right hand. In April, 1904, she noticed that she was unable to do fine movements with the right hand. Eight weeks later, first fit: started with numbness in the right hand and spread up the arm; immediately following the numbness the thumb became drawn into the palm of the hand. The shaking of the right hand was first noticed in April, 1904, and has never ceased since except during sleep. The fits have varied in frequency, at times two to three a month, at other times intervals of three months. The fits became more frequent towards the end of 1906. There was at no time any severe headache, vomiting, or optic neuritis. The right hand is kept rigid, the wrist being bent and the fingers flexed at the metacarpo-phalangeal joints. There is constant rhythmical movement of the right wrist and fingers, which becomes of far wider excursion on attempted movement.

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[1] Shown previously before the Neurological Society, June 24, 1905.

By manipulating the hand the spasm of the hand entirely disappears, but is brought on again by the slightest attempted movement. There are no signs of organic disease. On May 3, 1907, Mr. Armour explored the surface of the left cerebral hemisphere, but failed to find anything abnormal in the membranes or surface of the cortex. During anæsthesia the right arm was completely flaccid, but the spasm returned in the right arm some time before the return of consciousness was complete. The condition of the patient has not altered in any way since the operation ; the fits have continued to recur at intervals.

Hemiplegia with Involuntary Movements.

By Campbell Thomson, M.D.

H. T., male, aged 43, during the South African War was kicked on the left side of the chest by a horse. Appears to have been unconscious for a few minutes, but sustained no direct injury to the head ; two months later he had a "fit," in which he lost his senses, and following this he first noticed weakness of the left side. Since then he has been subject to fits which, he states, begin by the left arm drawing up, and which can sometimes be restrained by forcibly preventing the movements of the arm. The fits become general, consciousness is lost, the tongue has been bitten and the sphincters relaxed. Since he has been in hospital he has had three fits closely following one another ; in these consciousness was lost, but no observation was made concerning their point of commencement. There is a moderate degree of weakness of the left arm and leg ; so long as the arm is kept with the elbow pressed against the side the limb is still, but with any attempt at movement there occurs a coarse, jerky movement of the limb, with hyper-extension of the fingers and thumb, and these movements increase in violence on attempting to touch any particular object. The leg is similarly affected, but less so.

The tendon reflexes are increased on both sides; the plantar reflex on the right side gives a flexor response, as it frequently also does on the left side, though here the movement is sometimes indefinite, but a typical extensor response has not been obtained. The superficial abdominal reflexes are usually brisk on the right side and diminished or absent on the left. There is frequently a "pseudo-clonus" to be obtained in the left foot. No definite changes in sensation have been found, though it is thought that pain is not felt so distinctly over the left side of the body. There is no loss of sense of position, and the power of localizing touch is good. The case is shown with a view to eliciting expressions of opinion as to the nature and position of the lesion and the line of treatment which should be adopted.

DISCUSSION.

Dr. ERNEST JONES suggested that both were cases of hysteria. That opinion was based particularly on the quality of the contracture in the first case and the pecuilar characters of the movements in both cases, also the absence of evidence of organic disease. In the first case it was stated that there were fits, giving the suggestion that there were Jacksonian convulsions. But that did not exclude hysteria, as such had been described in cases of hysteria many times, in which no lesion was found post mortem. In Dr. Thomson's case the character of the fits, the condition of the sphincters and the biting of the tongue did not absolutely exclude hysteria, as they occasionally occurred in undoubted cases of major hysteria. A diagnosis could be obtained by a psychological examination of the cases.

The PRESIDENT (Dr. Beevor) said he could not agree with what Dr. Ernest Jones had just said as to complete loss of consciousness, biting of the tongue, relaxing of the sphincters, being associated with hysteria, and he could not let that statement pass. He thought Dr. Thomson's case should be trephined, as he thought there must be some gross lesion in the cortex.

Dr. GORDON HOLMES said he had seen cases similar to Dr. Batten's in which the causes of the persistent clonic movements were ascertained by post-mortem examination. One was at the National Hospital, under Dr. Turner. There were movements of the hands and fingers similar to those in Dr. Batten's case, only of less duration. They frequently developed into typical unilateral Jacksonian attacks. The patient died, and there was found a small tubercular tumour, about the size of a hazel nut, in front of the arm area. The other case was a much less valuable one, that of a boy with juvenile general paralysis of the insane. The first time he saw the case there were movements similar to those in Dr. Batten's case. He afterwards obtained the brain for examination and found a considerable focus of disease, chiefly in front of the arm area; there was some softening there. As he was house physician at Queen Square when Dr. Batten's case was first in hospital, he was able to add one fact which excluded it being functional, namely, the development of complete pure motor aphasia and right hemiplegia of the typical exhaustion type, with an extensor response after the epileptiform attacks, which disappeared gradually.

Dr. BATTEN, in reply, said he showed his case a second time because he had seen Dr. Campbell Thomson's case, and it seemed so similar that he thought it would be useful to compare the two. Having had this case under observation for four years and having seen the definite Jacksonian attacks, with loss of consciousness, biting of the tongue, and involuntary micturition, he thought there could be no doubt of its organic nature. He did not think there was any ground for saying those symptoms occurred in functional disease. The case had been trephined because the symptoms seemed to be so definitely localized. Mr. Armour exposed the motor area of the cortex on the left side. He was glad he did not explore the cortex, because in such a case as this, in which the movements started in the thumb and fingers on the right side, a condition of aphasia might most easily be produced. In regard to Dr. Thomson's case he thought it very desirable that there should be exploration, without which one could not say whether the lesion was deeply situated or on the surface of the cortex. He did not doubt it was organic.

Dr. CAMPBELL THOMSON, in reply, said the question of functional disease in his case had been carefully considered, and though in regard to the physical signs there was at first very little on which to base a positive statement that it was organic, he confessed that when the symptoms enumerated occurred in hospital he thought they sufficed for regarding the case as organic. If such symptoms could occur in functional disease the whole aspect of such cases was altered. He wished for opinions as to whether the cortex should be explored; his own view was that it should be done.

A Case of Extreme Lordosis of two years standing in a Woman, aged 32.

By CAMPBELL THOMSON, M.D.

THE patient dates her trouble from a fright which she received in August, 1906, and after which she states she "felt something give" in her back, and on looking in a mirror she then for the first time noticed an alteration in the shape of her back. Further inquiry, however, makes it seem likely that the onset was more gradual. There was never any pain, but the curvature has gradually increased.

On January 28, 1908, the patient came into the Middlesex Hospital under the care of Mr. Pearce Gould, to whom I am indebted for permission to show the case. There is at present a very marked degree of lordosis, which is associated with a strong contraction of the erector spinæ muscles, and, moreover, this contraction does not disappear when the patient is deeply anæsthetised with chloroform. There is no tenderness or pain and there is no lateral curvature. Nothing abnormal has been discovered in the hip-joints. The knee-jerks are often difficult to obtain owing to rigidity of muscles, but when obtained they are brisk. There is a pseudo-ankle-clonus, and an extensor response of the plantar reflex has been obtained on both sides, but this sign is very variable. The left foot shows a tendency towards pes cavus. There is no loss of sensation and no incoördination. Nothing abnormal has been noted in the eyes. The speech is perhaps rather slow, and the mental condition does not seem quite normal. There is also a tendency to neurosis in the family, one brother having suffered from "religious mania."

The frequent elicitation of an extensor response, together with the complete persistence of the muscular contraction during deep anæsthesia, makes it doubtful if the condition can safely be regarded as one of purely functional origin, and the question arises as to whether it is a case which can be included in the group of family diseases, and in this respect a further point of interest arises from a statement of the patient that one of her sisters has a similar curvature, but this has not at present been verified.

DISCUSSION.

Dr. WILFRED HARRIS said he had had an opportunity of seeing a similar lordosis in a boy—similar in position and nearly similar in degree. The symptoms developed suddenly under a typical mental shock. He was put under an anæsthetic and, as in Dr. Thomson's case, the lordosis could not be reduced. He did not think that inability excluded hysteria. In his own case the lordosis had been present five months when the anæsthetic was given. He thought true contraction could take place in the ligaments as a result of hysterical contracture. In this woman the symptoms developed after the death of her mother. Her brother had religious mania and her sister had some degree of spinal curvature. He could not accept Dr. Thomson's dictum as to the plantar reflexes being extensor. The left was, in his opinion, flexor, the right doubtful.

Dr. ORMEROD said he thought the left reflex was definitely flexor; the right, sometimes extensor, sometimes flexor. This variable condition was not infrequently the precursor of a permanently extensor reflex.

Dr. FARQUHAR BUZZARD said he had obtained an extensor response on the right side on stimulating the outer part of the sole, and a flexor response on stimulating the inner side, which was the usual condition of things in the indefinite cases. With regard to the relaxation of contractures under an anæsthetic, he recently had a case in hospital which had some interest in that connection, namely, a contracture of the flexors of the hip and knee. It appeared to be purely functional and lasted more than two years. Under an anæsthetic it could be reduced considerably, but not completely. He agreed that contracture could form as a result of prolonged hysterical flexion, but in those cases he thought some reduction under anæsthetics was always possible. He asked whether Dr. Wilfred Harris obtained partial reduction under chloroform.

Dr. HARRIS said it was partially reduced, but went back afterwards.

Case of Primary Spastic Paraplegia illustrating the Nature of Schäfer's Reflex.

By ERNEST JONES, M.D.

History.—Patient, a boy, aged 11, began to walk when aged 2, and has always had difficulty in walking; this has very slowly progressed. No backwardness in speech or intelligence. He is the second of three children, the other two being healthy. The labour was natural and easy. There is no evidence of syphilis in himself or parents. No similar case known in family.

Physical Signs.—Hypertonicity of lower limbs; spastic gait; talipes equino-varus, more marked on right; coldness of feet All deep reflexes in lower limbs greatly exaggerated in activity, and a crossed adductor-jerk can be obtained by striking the adductor tubercle, the patella, or the patella tendon. Rectus- and ankle-clonus marked. Babinski, Oppenheim, Remak signs positive; Mendel negative. Schäfer's paradoxical reflex can be obtained by either pressing on the insertion of the gastrocnemius or by strong stimulation of the overlying skin; it is therefore probably a cutaneous reflex.

Dr. JONES said he thought the case interesting from the points of view both of physical signs and of diagnosis. It showed many of the signs indicating pyramidal disease, including the paradoxical reflex. This was described first by Schäfer in 1899; then independently by Gordon in 1904. It consisted in an extensor toe response elicited by pressure over the gastrocnemius. The same response could, however, be obtained by pinching the skin over the muscle so that, as Lasaren showed in 1904, it was really a cutaneous reflex. In cases when the plantar reflex gave an indefinite answer, Schäfer's sign might make it possible to recognise organic changes in the pyramidal tract. From the point of view of diagnosis he would like to suggest that some of these cases showing only spastic paraplegia might be hereditary in origin even though no similar case could be discovered in the preceding generation. In the present case there was no evidence of syphilis, meningeal hæmorrhage, old encephalitis, &c., and the slowly progressive course of the disease was very similar to that of true hereditary spastic paraplegia. Certain recessive Mendelian allelomorphics could occur in only a small percentage of individuals, say 1 in 64, and this might account for the apparent sporadicity of such occurrences.

Three Cases of Amyotonia congenita.

By JAMES COLLIER, M.D.

CASE I.

MALE, aged 5. Family history good; two other children quite healthy; parents healthy; pregnancy uneventful; birth normal, at term; flaccidity and weakness noticed from birth. The amyotonia affects the whole voluntary musculature except the face; the child is progressively improving.

Notice the absence of any actual paralysis, the entire absence of local muscular wasting, the flail-like joints, the peculiar feet, the soft feel of the limbs, the contracture at the knee and hip.

CASE II.

Male, aged 5½. Family history good; fifth of seven children; two died in infancy; the rest are healthy; parents healthy; pregnancy and birth natural. Amyotonia noticed soon after birth; marked when aged 6 months; it became much more noticeable when aged 1; progressive improvement latterly. The amyotonia is most marked in the upper extremities, the contractures in the lower extremities.

CASE III.

Female, aged 2. An only child; birth and pregnancy normal; the amyotonia is said to have come on for the first time and rapidly after an attack of bronchitis when aged 1; the child is said to have been entirely unable to move the legs for six months after the onset, after which power of movement slowly returned. The legs are much more affected than are the arms.

A Case of Amyotonia congenita.

By J. R. Whait, M.B.

Male, aged 7½. It is stated that several members of the mother's family were unable to close the eyes properly, and that the mother was weak upon her limbs as a child; mother subjected to many frights and privations during pregnancy. Amyotonia noticed soon after birth, which was normal and at full term. He could not grip anything in his hands till he was aged 3. Amyotonia marked in upper limbs and face, contractures very marked in legs, giving rise to talipes, which has been operated upon. The trunk has always been the strongest part of him.

This case has been under constant observation for years and has progressively improved and he is now beginning to walk; the knee-jerks, which were till recently persistently absent, are now present, and slowly becoming more active.

DISCUSSION.

Dr. F. E. Batten said the Section was much indebted to Drs. Collier and Whait for bringing this series of cases forward. Three or four years ago the Neurological Society devoted an evening to the discussion of myopathies, when a group of cases was shown under the name of the "infantile form," which closely corresponded with the cases shown this evening. He thought the present cases were instances of myopathy. It might be argued that the name myatonia congenita did not exclude them from the group of myopathy. If that were so, and if it were merely a subdivision of the group of myopathy, he accepted the term, but he thought it was bad to classify them under a separate name, especially one which was very liable to be confused with that of myatonia congenita. It would be far better to classify them as myopathies and give them a special name. The great point of distinction from myopathies which had been made with regard to these cases was that they tended to improve. But it was not very uncommon for cases of myopathy of congenital origin to improve to a certain degree. A child born myopathic was necessarily feeble and late in development. It learned to walk late, if at all, and often walked in a peculiar manner. One of the cases shown at the previous discussion was that of a boy who had contraction of his legs, and walked with the buttocks resting on the heels. The case shown by Dr. Whait was specially interesting, because it showed a connecting link between the so-called myatonia congenita and the myopathies. The patient showed very well the weakness of the facial muscles, a well-recognised characteristic of the type originally described by Landouzy and Déjérine. He did not doubt that cases would be found which represented the transition between his cases shown and other well-recognised groups of myopathy. Two of his cases shown at the former meeting had died, but he had been unable to get a post-mortem in either case.

Dr. HEAD said he thought the discussion could be made precise in the following way: He came hoping to see a new clinical form of disease, but he had been struck with the resemblance shown by most of the cases to myopathy. If amyotonia congenita was a subvariety of myopathy which could be combined with other forms in the same way as the facio-scapulo-humeral form might be combined with the pseudo-hypertrophic or with essential atrophy, it would be an interesting addition to our knowledge of this group of disease. To support the view that it was an entirely new disease it would be necessary to show patients different from those shown that day, many of whom showed signs resembling those of one or other form of myopathy. It was necessary to have a clear statement as to whether the cases were instances of a new form of myopathy, interchangeable with any other subvariety, or whether they were supposed to be examples of a new disease.

Dr. COLLIER, in reply, said he saw the cases which Dr. Batten showed a few years ago, and he was certain they were of the type now being discussed. As to whether amyotonia was a subvariety of myopathy, he thought that in the absence of any knowledge on the pathology one must speak in clinical terms, and he did not see much clinical resemblance between amyotonia and myopathy. In the two conditions one had to deal with children suffering with weak muscles and contractures, and there the resemblance ceased. He thought the two essential features by which one recognised myopathies were local muscular wasting and local muscular weakness, and those were conspicuously absent in all the cases which had been reported as cases of amyotonia. Of the twenty-five cases reported, in all except three the condition was noticed at birth, *i.e.*, the flaccidity of muscles, which is not conspicuous in myopathy. In the other three cases it had come on suddenly as a result of acute illness in children previously healthy, two of them having learned to stand and walk. One was a patient shown before the Neurological Society by the President, and was different from any myopathy which had been described. The child was healthy when aged 1 year and 2 months, and a week later was paralysed from head to feet as a sequel of acute bronchitis. In amyotonia no heredity tendency had been noticed at all, if the very vague history in Dr. Whait's case were excluded. Facial weakness had been noted in three cases out of twenty-eight, and always of the same type, present at birth, and amounting to inability to completely close the eyes. Clinically it was, in his opinion, an entirely separate group, and should be distinguished from myopathy. Improvement was much more the rule than had been indicated by Dr. Batten and Dr. Head. He invited them to show a case of myopathy in which, under the most experienced observation of eight years, the knee-jerks were persistently absent and had returned. That also was outside his experience of myopathy.

The PRESIDENT said the case of his which was shown came on after acute bronchitis, and its onset was very rapid indeed, much more so than a myopathy, and was in favour of this case being a definite disease apart from myopathies.

Multiple Neuro-fibromata and Spastic Paraplegia.

By Theodore Thompson, M.D.

Man, aged 49; weakness of legs for many years. As a boy known as the "laggard." When aged 20 was examined by a doctor and refused for railway work on account of weakness of legs and "lumps on the skin." Since January, 1907, weakness of legs has increased and he has urgency of micturition. At Westminster Hospital in May, 1907, one of the subcutaneous tumours was removed and found to be "a soft fibroma with no evidence of nerve detected."

Present Condition.—Extremely large number of neurofibromata, many of them painful. Leg, spastic with much adductor spasm; knee-jerks increased. Babinski's sign present, both sides. Complains of numbness and coldness in the left leg. No changes in sensation.

DISCUSSION.

Mr. Donald Armour said neuromata growing on nerve roots were always multiple, and implicated not only the nerve roots in the spinal canal but also the cranial and peripheral nerves. The nerve roots were particularly resistant to the effects of neuromata growing on them, and were not destroyed as a result of their presence.

Dr. Head, in reply, said the cranial nerves were not affected in the case. There was no evidence of paralysis of cranial nerves or ordinary peripheral nerves.

Wasting of the Small Muscles of the Hand in a Girl, aged 20, and her Father, aged 46.

By Theodore Thompson, M.D.

The girl was admitted to hospital with rheumatic endocarditis and her hands were noticed to be much wasted. This, she said, "ran in the family."

Hand muscles: All much wasted.

Electrical reaction—Left: excitability greatly diminished; slight reaction in second interosseous muscle to galvanic current. Right: no reaction, except in adductors of thumb, in which excitability is greatly diminished and which react only to galvanic current.

There is no loss of sensation in the hand or arm. The father's hands show a similar condition. In both the onset was at puberty, but the wasting of the hands has never prevented the father from working as a dock labourer, though he cannot pick up a small object easily.

Radiographs of the cervical spine show pressure of cervical ribs in both cases.

(These cases were shown by Dr. Head in the absence of Dr. Thompson.)

DISCUSSION.

Dr. HINDS HOWELL said he had investigated a good number of cases of cervical ribs, and he did not think the symptoms exhibited by this girl could be explained on that assumption. She had no sensory change at all and he doubted whether a cervical rib ever caused pure motor weakness unaccompanied by sensory change. Moreover, the skiagram showed only one cervical rib in this case, and the condition was bilateral.

Dr. PURVES STEWART said the condition might be closely allied to peroneal muscular atrophy. There was no note of the condition of the feet in the case, as to the presence or absence of pes cavus. Cases of pes cavus and manus cava about the age of puberty were known, of hereditary form, and they were fairly typical of peroneal muscular atrophy. He suggested that this case was one either of the peroneal type or of some closely allied variety.

Dr. HEAD, in reply, said the feet had not been affected in any of the patients seen by Dr. Thompson. The exhibitor brought these cases before the Section because he could not find anything of the kind recorded, and also because the family tree was an unusually good one. Dr. Thompson was gradually accumulating more material on the subject, and he hoped to publish the full account of this family shortly.

Cervical Caries: Operation and Recovery.

By DONALD ARMOUR, F.R.C.S.

EMILY R., aged 3, admitted into Belgrave Hospital, March 20, 1907, under the care of Dr. Farquhar Buzzard. Fell out of her mail-cart when aged 11 months; holds her head extended and screams if any attempt is made to flex it during the past two years; six months ago began to lose power in her legs and this gradually extended to her arms.

On Admission: Complete spastic paraplegia, together with almost complete loss of power in both arms; arm- and knee-jerks exaggerated; ankle-clonus; plantar extensor response; loss of sensation indefinite over limited areas in legs; complete loss of sphincter control; neck muscles in a condition of spasm; marked kyphosis of spine. Skiagram shows tuberculous disease of two or more cervical vertebræ. Respiration very defective. Five months rest on back without improvement. Laminectomy August 8, 1907. Large abscess, only limited by the deep fascia, was opened. Laminæ of third and fourth cervical vertebræ were destroyed and the bodies merely represented by pieces of loose necrosed bone. Abscess surrounded cord. Abscess was evacuated as quickly as possible, the sequestra removed as far as possible and the wound closed without drainage. The wound healed by first intention. One week after the operation some power had returned in the legs and arms, though the sphincter loss remained. September 6, 1907: legs moved freely, spasticity disappeared, sphincter control returning. Rapid improvement so that by the end of December, 1907, the patient was up and walking without assistance.

Dr. FARQUHAR BUZZARD said the case was under his care five months without result before he handed it over to Mr. Armour. He had not thought it possible that any child could live with the condition he had seen at the operation. Most of the cervical vertebræ seemed to be converted into an abscess, from which bits of bone were picked out. He was very much surprised to see the child walking about a few months afterwards.

Two Cases of Tabes.

By C. M. HINDS HOWELL, M.D.

CASE I.—WITH PYRAMIDAL TRACT DEGENERATION.

H. M., AGED 35, complains of shooting pains in both legs, which he has noticed for three to four years. He has had occasional diplopia; no sphincter difficulty; somewhat unsteady in dark. Patient is married, but has no children. Wife has had no miscarriage.

Past History.—Admits gonorrhœa, but denies syphilis. Has had extremely good health otherwise. Has been very athletic.

Family History.—Father dead, suffered much from eczema. Mother alive, has mental lapses with suicidal tendencies. Patient is youngest of five; one sister epileptic, one sister died when aged 7, one brother has tabes, one brother has eczema very badly.

Present Condition.—Patient's intelligence, speech, memory, &c., are excellent. There is nothing to indicate general paralysis in his mental condition. The right pupil is larger than left—both Argyll-Robertson. Both discs are extremely pale, but the retinal vessels are still of fair size. Visual acuity is $\frac{6}{6}$ right and left, and the fields are not restricted. No tremor or incoördination in arms. Gait is natural. Reflexes: all deep reflexes are exaggerated; plantars extensor, right and left. Sphincters normal. Sensation: subjective, pains as above; objective, considerable analgesia of legs, ulnar analgesia and loss of muscle pain sense. No tactile anæsthesia.

CASE II.—WITH PARALYSIS OF PALATE AND VOCAL CORDS.

E. M., a labourer, aged 26, married; two children; wife no miscarriages.

Past History.—Admits syphilis seven years ago; was treated for two years with pills and gargle. Otherwise healthy.

Present Condition.—For the last year has noticed his speech has changed, *i.e.*, become more nasal. For some time the left eyelid has "drooped" more than usual, though it has always had a tendency to do so. Occasional regurgitation of fluid through nose. For the last nine months has had occasional attacks of dyspnœa; wakes at night sometimes and has difficulty in getting his breath. Occasional diplopia for last two years. Legs easily tired. Patient is a thin man with bilateral ptosis, most marked on left side. The pupils are equal; they react briskly on accommodation, but not to light. No defect in visual acuity and fields normal. Ocular movements good. Ninth, tenth, eleventh cranial nerves: double palate paralysis, double abductor paralysis of vocal cords. Sterno-mastoids and trapezii are unaffected. Upper and lower extremities possess fair power, no incoördination or ataxy; gait natural. Reflexes: knee-jerk may be obtained on right side with reinforcement; easily on left; ankle-jerks not obtained; sphincters natural. Sensation: complains of no pains beyond some aching in the back of his neck. Objective: analgesia of legs; no tactile anæsthesia.

The PRESIDENT said the first of the cases was a curious one, in that there were signs of tabes and the plantar reflex was extensor, which was very rare in tabes. He had seen it in only one case. The other case was also interesting, because whereas the patient had complete paralysis in the soft palate he could yet close the posterior nares and blow out the cheeks. Thus he would close the posterior nares reflexly but not voluntarily.

Two Cases of Cerebral Diplegia (non-congenital) in Children.

By Leonard Guthrie, M.D.

Case I.

Miranda A., aged 3 years and 7 months. Admitted to hospital on account of inability to sit up, stand, walk, or talk, and weakness of right arm.

History.—Well until twelve months ago, except for rickets; could walk and talk; then sudden paralysis of left arm was noticed one night, with pain on movement of right leg; had seemed quite well on the preceding day. Three weeks later the left arm had regained power, but the right leg was noticed to be weak and the toes were contracted; at this time she fell and injured her head, was sleepy and did not speak for three days, but was not unconscious; recovered completely. Four weeks later right (? left) face and arm and left leg became paralysed, and speech was lost; in the evening of the same day she was able to move right arm slightly and speech returned. Next day a similar attack without loss of consciousness. Eight days later she became rigid and unconscious; twelve hours later recovered consciousness, but was still paralysed, and speech was again lost. Three days subsequently began to move arms and legs. Since then (ten months ago) has slowly improved, but speech has not returned, although the child tries to talk.

Present Condition.—Slightly rickety; curious brachycephalic skull, resembling Mongolian type; takes notice and plays with toys, and does not look unintelligent; discs and cranial nerves normal; query slight weakness of right lower face; movements of head and neck are normal. Cannot sit up and remain in sitting position for more than a few moments without support. Left arm is normal, but right shows weakness and hemiplegic rigidity; does not use right hand. Cannot stand, but on being supported in erect position and made to advance, progression is cross-legged; some spastic rigidity is present: all leg movements are performed, but their range is limited. Reflexes: knee-jerks are active; plantar response indefinite; ankle-clonus is absent; right triceps-jerk is exaggerated.

Family History.—Mother: first pregnancy ended in miscarriage in fifth month; one other child, aged 4½, is healthy.

Remarks.—The history of gradual onset, culminating after two months in present condition, point to a subacute form of encephalitis; the ill-shaped head suggests developmental defect, which, perhaps, was a predisposing cause.

CASE II.

Florence C., aged 5. Fifteen months ago adenoids and tonsils were removed. During the succeeding fortnight she vomited after food and was very drowsy. She then contracted measles, not very badly (rash, sneezing and coryza). On recovering from measles, arms, back and legs were noticed to be weak. Has never been able to feed herself since. At first she could walk and play, but frequently fell. Within a few weeks could neither stand nor walk, nor sit up for any length of time without support.

Present Condition.—Healthy-looking, well-nourished child; intelligent, though quiet and apathetic. Cranial nerves unaffected; (?) slight weakness of soft palate; voice nasal and indistinct. Neck muscles weak; hangs head; can drag herself to sitting position, but cannot rise to it unaided. Upper extremities: intention tremors and considerable ataxy present; cannot grasp an object with any precision, and cannot regulate force of hand-grasp. Lower extremities: varying rigidity present and ataxy; cannot stand alone when placed on feet, hangs head, draws up heels; progression is markedly cross-legged from adductor spasticity. Reflexes: knee-jerk very much exaggerated; ankle-clonus variable, sometimes very marked (336 per minute), at times absent. Plantar response indefinite; Achilles-, triceps- and supinator-jerks exaggerated. Has no sphincter control, but makes wants known.

Family History.—Father, aged 38, mother, aged 38, healthy; ten other children, all strong and healthy; two died of convulsions.

Remarks.—Both cases resemble the more common variety of congenital cerebral diplegia; both suggest a slowly progressive encephalitis, in the latter case associated with measles.

A Case of Cervical Caries.[1]

By E. Farquhar Buzzard, M.D.

Girl, aged 15. When last shown was paraplegic from the neck downwards and had been so for many months in spite of rest in bed. For the last four months she has had rest and extension, with the result that she has practically lost all pressure symptoms, can walk and use her hands for all ordinary purposes. There is no anæsthesia now. The results of extension were strikingly rapid.

A Case of Unusual Vertebral Deformity with Seventh Cervical Ribs.

By E. Farquhar Buzzard, M.D.

A girl, aged 15, complained of something wrong with her right hand, of the middle finger dragging and of some membranes of the hand and lower forearm. She noticed, too, that the right hand was often colder than the left, and that there was sometimes an aching pain in the region of the right shoulder. A year previously a doctor had accidentally noticed a slight lateral curvature in the upper dorsal region, and she had been treated with exercises, &c. On examination, the right hand is generally colder and bluer than the left, the middle finger shows a tendency to the position assumed by the fingers in a claw hand; the interosseous muscles appear very slightly wasted. In other respects the limb is normal in appearance as high as the shoulder, which is lower than the left. The contour of the right neck is different from that of the left and suggests an atrophy of the trapezius muscle, which does not exist. The right side of the sternum is a little full at the level of the second costal cartilage, which is displaced a trifle forwards. Examination of the spine shows a displacement of the upper three or four dorsal vertebræ to the left of the mid-line without any evidence of undue rigidity, pain or tenderness on pressure. A skiagram shows that there is a long seventh cervical rib on the left side and a short one on the right; that the bodies of two of the dorsal vertebræ appear fused together, with a vertical line suggesting the imperfect division of the bodies into lateral halves. There is no evidence of disease within or without the bones, and the patient is quite free from any signs of compression on the cord. The case appears to be one of embryonic abnormality of the cervico-dorsal column and is analogous to the interesting series which have lately been so well described by Max Böhm in the *Boston Medical and Surgical Journal.*

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[1] Shown before this Section on October 31, 1907 (*Proc. Roy. Soc. Med.*, [Neur. Sec.], November, 1907, i., p. 12).

A Case of Bulbar Paralysis with unusual position of the Head.

By J. Fletcher Little, M.B.

A. C. H., aged 34. Electrical engineer. Illness began three or four years ago. Could not whistle; speech affected for two years. Difficulty in swallowing for one year. No history or symptoms of syphilis.

A skiagram showing greatly increased anterior curve of cervical vertebræ was exhibited.

Neurological Section.

May 6, 1908.

Dr. David Ferrier, F.R.S., in the Chair.

The Mechanism of Nystagmus.

By Sir William Gowers, M.D., F.R.S.

The precise origin of nystagmus is still obscure. The oscillation of the eyeballs, which constitutes the symptom, obviously depends on the alternate contraction of the opposing muscles, and this was pointed out long ago. That the muscles which contract alternately are normally synchronous and related in their action is also obvious. The opponent of an acting muscle should support it, and yet yield so as to permit movement; this is also clear, and is familiar to us in the case of other muscles as well as those of the eyeball. It is unfortunate that we have no convenient antithetical designations for acting muscles and their opponents or antagonists. The Germans have devised such words by taking as their guide the word "antagonist," and calling the acting muscle "agonist"; but the word "agony" has associations not easily replaced by the mere sense of action. A better combination is presented by "ergic" and "antergic," formed after "synergic." Otherwise, if we shrink from "agonist," we must be content without a clear antithesis.

Nystagmus is best observed when the movement is slow and wide in range. This is generally the case in the outward-moving eye in the horizontal form, in which the primary movement is by the external rectus and its antagonist is the internal. As a rule, the wider the range, the slower is the nystagmus, but the mechanism of all forms must be the same. They may coexist, and one may pass into another.

The contrast of the alternate contraction of nystagmus, compared with the synchronous balance of the normal state, is striking. In the alternation the balance afforded by the antagonist is apparently present during the action of the muscle causing the movement, until the latter suddenly ceases to contract, and a contraction of its antagonist takes its place, to cease in its turn.

What can we discern or conceive to be the origin of this alternation? Can we perceive any analogous process elsewhere? The force exerted by the ocular muscles is minute in comparison with that of the muscles of the limbs, subserved by the centres of the spinal cord, but the central control of all voluntary muscular action must be essentially the same. The facts observed by Sherrington[1] regarding the automatic action of the spinal centres seem to be of great importance in their bearing on the problem of nystagmus. He deprived the lower spinal centres of the influence of the will by dividing the spinal cord in the cervical region. The animal thus treated he termed "spinal," because the muscles of the hind limbs are then only under the control of the centres of the spinal cord. He found that a remarkable condition was set up, in which a set of muscles and their antagonists passed into alternate automatic action. If, for instance, the extensors of a joint were excited to contraction so as to cause movement, when this had reached a considerable degree, they suddenly ceased to contract, and their opponents, the flexor muscles, contracted instead, presently to cease, and the extensors again came into action, and so the alternation went on. He has shown that the sudden relaxation of the muscles first contracting is due to an inhibition of their spinal centre, produced by an afferent impulse from their antagonists. He ascertained this by dividing the nerve of the antagonists and stimulating the central end. The effect was instantly to inhibit the contraction of the acting muscles. Since the nerve divided was solely muscular, although it contained afferent as well as motor fibres, he concludes that the inhibiting impulse must originate in the opposing muscles through their extension, and that the effect is produced by the tension acting on the muscle-spindles. This process he terms a muscle-reflex action, applying to their reciprocal influence the term I introduced in connection with the knee-jerk. For this, its use in connection with one muscle, the term idio-muscle-reflex may be employed. It is possible, indeed, that the secondary contraction of the extended muscle may be of this idio-reflex nature. But the important fact is that the spinal centres contain a mechanism by which, if unrestrained, they automatically develop an alternate contraction of opposing muscles.

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[1] Sherrington, "Correlation of Antagonistic Muscles," *Proc. Roy. Soc.*, 1893, liii., p. 407.

In passing, I may remark that these facts remind us of some of the features manifested by over-action of the lumbar muscle-reflex processes when lateral sclerosis lessens the volitional influence. I recall a case of hemiplegia in which the weak and spastic leg presented a close reproduction of the alternation obtained by Sherrington. When the patellar tendon was tapped in the customary posture, there was a considerable, but rather slow, movement upwards of the leg, followed by a slow descent, and this by another rise. The succession went on automatically about half a dozen times, the frequency being 40 or 50 a minute. This must have been due to the mechanism Sherrington has described.

The alternate contractions which were obtained by Sherrington seem to be essentially the same as those presented in well-marked nystagmus. To take the example just mentioned : the motions of the outward-moving eye in the horizontal form. The external rectus moves the eye to the right, and just before it reaches its full degree of contraction, it suddenly ceases to contract, and at the same moment its opponent, the internal rectus, contracts, and brings the eye back, a little more slowly. But just before it reaches the mid-position this muscle in turn ceases to contract and the external rectus resumes its action, and so on, in continued automatic alternation. So precise is the resemblance to the reciprocal muscle-reflex action in the unvolitional spinal cord that we are compelled to ask, Are they not the same in nature ? Is not nystagmus a reciprocal muscle-reflex alternation between the antagonistic ocular muscles ? The answer must, I think, be in the affirmative, in spite of some difficulties to be considered.

One, which is apparent rather than real, is the supposed absence of neural spindles in the ocular muscles. But Farquhar Buzzard has described structures resembling them in these muscles. Their tendons contain similar organs, and the fact that a small twig from every nerve of an ocular muscle passes to the fifth nerve, which can only conduct upwards, has long made it certain that afferent impulses arise in the muscles. They no doubt pass to the highest cells of the fifth nucleus, which are in the neighbourhood of the motor nuclei.

There remains another difficulty, not to be escaped in so direct a manner. The arrangement in the centres of the spinal cord for the automatic alternation becomes effective when there is loss of the controlling influence of the will. But this does not seem to be the cause of nystagmus. It does not result from disease of the cerebral hemispheres above the central ganglia, and of these, perhaps, only when the optic thalamus is affected. The lesions that give rise to nystagmus are situated in or near the mid-brain and pons and in the cerebellum. They are so placed as to be capable of affecting the various influences that act on the reflex centre for the eyeballs, and justify the assumption that its insubordinate activity is due to a primary disturbance of its balance.

The existence of such a centre in the mid-brain, including the pons in the term, has been long assumed. The reflex and coördinating centres in the spinal cord must be represented, in the case of the ocular muscles, by central structures near their nuclei, through which the volitional impulse acts. The bilateral association of the eye movements must be arranged in it, and so must the reflex action of the ocular muscles, of which there is abundant other evidence. Yet doubt has lately been expressed regarding the need for the assumption of such a centre, apart from the nuclei themselves. Perhaps the difference of opinion may be due to the conceptions attached to the words. If we mean by "nucleus" only the cells from which the fibres arise, we cannot understand the facts without assuming higher coördinating structures. On the other hand, the word "centre," in a physiological sense, only implies structures which act together for a certain function, and does not imply their position in a circumscribed situation. Nerve elements may act together when they are not in close proximity. Kornikow designates the assumed centre "supranuclear," but this term has been used in a wider sense, and somewhat begs the question at issue. "Mid-brain ocular centre" seems less open to objection.

The centre for combining the vertical movements of the eyeballs has been supposed to lie beneath the anterior quadrigeminal bodies, but some doubt still exists. That for lateral movements seems to be still uncertain. We cannot doubt that the posterior longitudinal fibres connect its elements. Moreover, the crossing of the fourth nerves and the belief that many of the fibres of the third nerve arise from the cells of the opposite nucleus increases the difficulty of discerning the position of the structures that subserve combination and reflex action. Those that are related to the various movements must be in the most intimate functional combination. But the precise localization of the structures is outside my present subject.

We may assume that the centre which combines and coördinates the actions of the muscles of the two eyes also subserves the muscle-reflex action; the influence on it of light is an interesting point. The reflex action of light is probably double; there is a light reflex, subserved chiefly by the mid-brain, and a visual reflex acting through the hemisphere, though these may not be separable. The former only concerns us now, and of course only in relation to the external muscles. It is little conspicuous in adult life, but long ago (in the second volume of *Brain*) I described a case in which it seemed revealed by disease. The patient was in the ultimate stage of amyotrophic lateral sclerosis, with universal rigidity. During the last week of his life a peculiar ocular system existed. If the patient was looking at an object on one side, and was told to look at another object on the other side, say 45 degrees away, the head was instantly turned so as to face in the new direction, but the eyes remained fixed on the first object, and were only slowly moved in the fresh direction. The persistence seemed due to a reflex mechanism, which kept the eyes apparently still, but really caused them to move in the head as far as the head was turned, but in the opposite direction.

The most significant fact of the influence of light on the muscle-reflex centre is the origin of infantile nystagmus. This is an alternate contraction of the opposing muscles, slow and equal. It develops during the first month of life, when the child is acquiring the power to fix and follow a light. Its common cause seems to be an abnormal amount of the light that enters the eye. The nystagmus is apt to develop if any affection lessens the amount of light received, as in ophthalmia, and also if this is excessive, as in albinoes, in whom there is not the normal pigment to absorb it. The fact that this abnormal proportion of light prevents the development of synchronous action, and allows the alternation, is a fact of much significance. It shows that light also acts on the reflex centre which governs the muscles. Moreover, the fact that the alternation may develop from the mere disproportion of what we may conceive as the steadying influence of light shows that the structural arrangement of the centre must be such as to dispose to this alternation, and that the tendency to it is normally prevented by a control that readily becomes imperfect. We can conceive that a function may readily become deranged during the process of development. We have almost no indication of the influence of light on nystagmus in later life, unless miners' nystagmus shows its coöperative influence. There is a general agreement that the occurrence of this form is facilitated by dim lighting of the mine. It may also be concerned in the occasional cessation of nystagmus when one eye is closed; but the precise significance of this is uncertain.

Frequent as is acquired nystagmus in disease, we have little precise knowledge of the way its causes act. We only know that they are situated in or near the region in which we must look for the structures that subserve the binocular combination and the muscle-reflex action, or in such as directly act on them. The action of the centre must be determined by the influences that control equilibrium, and the movements of the head, and those that receive auditory impressions, as well as those of vision, as distinguished from mere light. But the lesions that most commonly give rise to nystagmus are rarely available as strict evidence of its causation. Disseminated sclerosis is almost always multiple, and we cannot say to which lesion a given effect is due, while a tumour, on account of the pressure it exerts, never affords a clear indication. An islet of softening, due to arterial closure, affords the least dubious evidence, but when this is found after death it is very rarely that the features of the nystagmus have been precisely and fully noted during life. Our present knowledge, if indefinite, suggests that the automatic action of the reflex centre becomes dominant with extreme readiness; the grasp of the centre by the volitional impulse, which secures the synchronous action of the antagonists, is of slender energy and unable to overcome any tendency to insubordination.

A deficiency or excess of the many influences acting on the centre disturbs its stability, at least in part, and allows the muscle-reflex alternation to assert itself. Some of these influences are worth considering, because their action can only be by such derangement, and they seem to show that, in the case of the ocular muscles, a disturbance of equilibrium may produce a derangement which, in the spinal centres, needs the arrest of the volitional impulse. The same lesson is taught by the features of nystagmus itself.

An area of necrotic softening on one side of the pons, which has destroyed the posterior longitudinal fibres but not the sixth nucleus, not only abolishes the movement of the eyes towards the side of the lesion, but causes wide nystagmus when they are moved towards the other side. This fact is relevant only as an instance of loss of balance in the centre.

The nystagmus produced from the labyrinth, which has been inaccurately termed "vestibular," is certainly due to deranged impressions from the semicircular canals. "Labyrinthine" would be a more accurate designation. It occurs on rotation of the body, accompanying for a few moments the intense sense of vertigo produced, which is absent if the canals on each side have been previously destroyed by operation. It occurs also when the tympanic membrane and ossicles have been removed, if the pressure of air in the middle ear, and therefore also in the internal ear, is increased or lessened. It is also caused by probing the canals, and by syringing the ear with hot or cold water, a form that has been termed "thermic." These labyrinthine causes are doubtless related to the connection of the ocular movements with the position and motion of the head, and they are instructive in regard to the readiness with which nystagmus is produced through the cerebellum. The acute disturbance of the ocular centre seems to allow the muscle-reflex action to become insubordinate for a few moments.

A quicker motion in the direction of volition is an almost constant feature of acquired nystagmus, and its direction is used as a designation. It is noteworthy that it is present even in labyrinthine nystagmus—when the pressure in the ear is increased, the quicker movement is from that side; when diminished, towards it. But the most important fact regarding this quicker movement, and indeed regarding nystagmus in general, is this—a horizontal nystagmus may dominate almost all movements. For example, a young man, probably suffering from disseminated sclerosis, presented such nystagmus, with the quicker motion to the right. It occurred not only on movement to the right, but also in the mid-position, and it persisted when the eyes were moved towards the left until each was half way to the left canthus. On further movement to the left, beyond this point, quicker motion to the left replaced that to the right. Thus during half the movement to the left, the quicker motion was in the opposite direction to that in which the will was acting. The right horizontal nystagmus persisted during both the upward and downward movements, at right angles to the direction of the will. [A similar case was described by Mr. Jessop some years ago to the Ophthalmological Society.[1]] There was no defect of movement in any direction, only the slight semblance of deficiency that is due to the inhibitory arrest occurring just before the movement reaches its full degree. The nystagmus was of long duration, and had slowly attained this dominance of the right horizontal form.

Such dominance of one muscle-reflex action is seen less frequently in other directions. In a girl with insular sclerosis, nystagmus was energetic on looking down, and it persisted in the mid-position, though the eyes presented little unsteadiness on looking up. There was also conspicuous lateral nystagmus in horizontal movements, but this motion evoked the activity of the downward oscillation so that the lateral nystagmus was not horizontal but oblique, the quicker movement being a slant to right or left and downwards.

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[1] Jessop, *Trans. Ophthal. Soc. U.K.*, Lond., 1887, vii., p. 264.

These facts show clearly that nystagmus depends on disorder of the mid-brain centre, and that although at first it may occur only when the voluntary impulse energizes the centre, the reciprocal action that is most disturbed may develop an independence of the will and even opposition to it, so far as the direction of the quicker movement is concerned. This enables us to understand that the insubordination of the centre may arise without defect of volition and by mere disturbance of equilibrium. Complete paralysis of a nerve is not attended by nystagmus, and that which may be observed occasionally in a partially paralysed muscle may be explained in the same way, by the defect in the influence on the centre from the muscle.

The extreme degree it may attain also enables us better to understand that nystagmus may also present slight and partial forms. The condition of the centre may be such as to subserve the combinations of muscles concerned in many of the movements, and their varying derangement may explain the peculiar character of some of the alternate actions met with. In the slanting movements of the eyeballs, between the horizontal and the vertical, the nystagmus may be sometimes in the direction of movement and sometimes in that of one of the constituent muscles which produce the movement. For instance, in one oblique movement the nystagmus may be vertical, in another horizontal, and this in the same patient, the two eyes moving alike. This shows that the muscles as well as the movement must be represented in the centre deranged. In the same way we can understand the occasional rotatory nystagmus, from the oblique muscles, which is almost always slight in degree, and more often unilateral than any other form. It is most considerable in the peculiar miners' variety. All these forms and others that I have not mentioned seem to me to present nothing inconsistent with the hypothesis that the alternation depends on a muscle-reflex action in consequence of insubordination of part of the reflex centre, due to a limited derangement of the influences which should keep its elements duly balanced. In slight degrees of disturbance, excitation by the will is necessary to evoke the muscle-reflex alternation, but when this has been long active the alternate action occurs also when the eyeballs should be at rest in the mid-position.

The considerations I have brought before you will, I hope, at least serve to stimulate observation and make it more precise and sustained. We need to know more of the course of nystagmus and of the mode of its increase, whether by general extension or by dominance in one direction. Pathological observations of its cause can only be fully instructive in conjunction with those of its precise character during life. Many features I have left unmentioned, and if I have not referred to the work of others it is because, in the multifarious writings on the subject, I have failed to find anything that bears directly on the hypothesis I have put before you. I must, however, mention the views of Willbrand, which, though published nearly thirty years ago[1] (in 1879), are still regarded as the best explanation of the mechanism of nystagmus. He ascribes it to disorder of the centre for common reflex action of the eyeballs or of the volitional impulse, so as to produce a want of harmony between the two. In connection with Sherrington's researches, it is curious to find in a paper of my own, published in the same year,[2] but not on nystagmus, a sentence on the part played in the spinal mechanism "by the reflex relation between muscular tension and muscular contraction."

Other difficulties in the way of this explanation of the mechanism of nystagmus will doubtless present themselves to many of you, but I think that observation and reflection may lessen the hindrance they at first seem to present.

DISCUSSION.

Dr. FERRIER said all would agree that the contribution was a very important one on the pathology of a symptom with which everyone present was familiar, but in regard to the causation of which we—speaking for himself, at least—were much in the dark. The subject appealed both to the oculist and the neurologist, though there were probably many present who had followed the paper attentively, but found it difficult to properly apprehend all the points at first hearing. Oculists would be specially interested in the question of nystagmus in relation to errors of refraction. He himself would like to hear more as to the causation of miners' nystagmus, which he had lately been studying. He did not know whether Sir William agreed with Nieden, one of the most recent writers, that it was due to the constrained position occupied by miners in digging holes in the coal, during which the eyes were directed upwards and in an intermediate direction, and that the nystagmus resulted merely from the muscular fatigue so induced. According to this view, nystagmus was mere tremor of the ocular muscles, similar to senile tremor or tremor of impaired innervation, and probably of the same kind as that seen in disseminated sclerosis.

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[1] Willbrand, *Klin. Monatsbl. f. Augenheilk.*, 1879, xvii., p. 419.

[2] "The So-called Tendon-reflex Phenomena," *Med.-Chir. Trans.*, Lond., 1879, lxii., p. 269.

Dr. F. E. BATTEN desired to offer some remarks on two points. The first was the importance which Sir William attached to the presence of the muscle-spindles in the eye. Their presence in the eye muscles was still a doubtful point, but it was well known that there were the ordinary sense organs in the tendons of the ocular muscles, and even if the muscle-spindles were not present he imagined these end organs would serve exactly the same purpose as the muscle-spindles. The author had also referred to the nystagmus which occurred in spasmus nutans. If that nystagmus was due to the fact that children were more than usually sensitive to a bright light, surely the movement ought to cease on the closure of the eyes. But it was curious that those children continued their movements apart from the fixation, and the nystagmus often appeared only after fixing the head. In them the nodding movements of the head took place, and while that movement occurred there was no nystagmus, but on fixing the head nystagmus appeared. It was true that, in some cases, the nystagmus was present at the same time as the nodding movement, but the view that this nystagmus was due to unusual sensitiveness to light was one which he always rather doubted. He had no explanation to offer of the condition in place of the view he had criticized.

Mr. ERNEST WEST said that, to the aural surgeon, nystagmus was a subject of daily interest and importance, and one saw many cases at hospital due to infections of the labyrinth. A few manifested spontaneous nystagmus; in others, abnormalities of the ordinary reflex nystagmus could be elicited. If a normal individual were twisted axially to one or other side, on suspension of the rotation nystagmus was evoked on deviating the eyes against the direction of rotation. If rotated to the right and stopped, on deviating the eyes to the left he got a nystagmus, with major movements to the left, and it was abolished by looking to the right. In a diseased labyrinth, that normal occurrence was interfered with. If the labyrinth were surgically removed or its function destroyed, there was complete absence of response. There was another interesting quasi-physiological phenomenon. If a patient had intense vertigo of labyrinthine origin, without definite gross disease of labyrinth, and the labyrinth was destroyed surgically, the vertigo would cease. But, while he might have had no spontaneous nystagmus before the operation, he would for a time have violent spontaneous nystagmus afterwards, which would gradually die away. He thought that was due, not to a stimulus from the operated labyrinth, but from an unbalanced stimulus from the sound labyrinth which did not come into consciousness as vertigo. In labyrinthine nystagmus the movement of the eyes was exactly the same as would be caused supposing that objects outside the patient were actually rotated in the direction in which he thought they moved when his labyrinth was stimulated in that way. It was like the movements of the eyes of people in a moving railway train watching telegraph poles—a snatching movement. It seemed to him (Mr. West) that this nystagmus was in some sense a direct reflex from the labyrinth rather than an upsetting of a regulating mechanism which was normally present, and which might be upset from other causes. He had hoped to have his ideas clarified on the matter, but he did not seem to have been carried much further. Perhaps other speakers might be able to help in the solution.

Dr. Charles Mercier said it had not been his intention to intervene in the discussion. It was thirty years since he had any speculations on the matter, but the Chairman's remarks induced him to ask Sir William to give a clear notion of the relation between nystagmus and tremor. Was nystagmus a tremor? He (Dr. Mercier) regarded tremor as a to and fro movement, equal in excursion and duration. But nystagmus was not a tremor in that sense, as Sir William had pointed out; it was a quick movement in one direction and a slower return. If nystagmus were called a tremor, it would be confounding two things under one name. He thought tremor could be readily accounted for without the aid of any such reflex mechanism as the author suggested, and he was not sure that nystagmus could not be accounted for in the same way. He thought tremor must be due to the lengthening out of the intervals between the successive neural shocks which produced the continuous contraction, and that, he believed, was the accepted doctrine. He believed it was conceivable that if that slowness or retardation of the rate at which the separate shocks went down the nerve to produce the continuous contraction were to act not upon a harmonized antagonism of muscles, as Duchenne called it, but upon a single muscle of an antagonized system, then the phenomenon of nystagmus would be produced; whereas if that particular retardation were affecting both nerves going to antagonized sets of muscles there would be produced ordinary tremor. He thought tremor was due to longer wave lengths in the descending current of energy to the muscle, and that there was no need to invoke the aid of any such reflex mechanism as Sir William Gowers suggested.

Mr. Bellamy Gardner said he was much interested in the paper because for the last twelve or fourteen years he had been observing the form of nystagmus caused artificially during the administration of nitrous oxide and oxygen to dental patients. It was an invariable clinical sign that a vertical form of nystagmus took place after the patient had lost consciousness, quicker in upward movement, gradually subsiding into rest, with the eyes looking downwards, in a convergent position. So far as he could discover it was independent of the action of light in any way, for it took place with the eyes closed, and was not affected by opening them. Its appearance was so constant that he had no doubt that by varying the depth of anæsthesia after it had been once abolished it could be re-established if needed for experimental purposes. In rare instances he had seen a horizontal nystagmus occur with the eyes deviated to the left, but never to the right. When deviating to the left as a rule the eyes would be looking towards the administrator, whose voice was very likely the last thing heard by the patient. In that case the quicker movements of the nystagmus were towards the mid-line. The explanation given by Sir William Gowers as to the withdrawal of the will power and the alternating action of opposing muscles was sufficient to account for the phenomena in these cases.

Mr. Sydney Scott said the paper interested him by reason of the practical knowledge of the mechanism of nystagmus in otology. Recently at St.

Bartholomew's Hospital they had investigated the nystagmus reflex by the application of heat and cold in middle ear disease where the labyrinth was suspected of being involved. After syringing the ear with water at progressively increasing temperatures of 110° F., 115° F., and 118° F., nystagmus of a definite type was produced. It slowly increased in intensity and was accompanied by marked vertigo. The direction of the major movement was towards the stimulated side. On deviation to the opposite side the nystagmus diminished or disappeared, and so did the vertigo. By lowering the temperature of the labyrinth gradually with water at 80° F., 70° F., and 65° F., the nystagmus produced was with major movement to the opposite side. These observations had already been made by Bárány in Vienna. Thirty cases which they had observed confirmed his (Bárány's) observations on thermal nystagmus, the reflex failing in cases in which the labyrinth was functionless. To illustrate the value of recognizing the significance of nystagmus he quoted the case of a boy with chronic middle ear disease who, thirty-six hours previously, was in good general health. For twenty-four hours he had severe pain in the right ear and was, at the time of examination, in a state of collapse with violent nystagmus towards the opposite side. It was this type of nystagmus which determined an immediate operation for acute labyrinthitis. In another case of acute unilateral labyrinthitis, recently seen, there was unconsciousness, but no nystagmus could be observed on deviation. He asked whether the state of consciousness played an essential part in the mechanism of nystagmus. With regard to ocular tremor, he and his colleague had tried the effect of stimulation by rotation, and found that the normal reflex with typical secondary nystagmus reactions replaced the fine tremor. Such elicited nystagmus lasted a few moments; afterwards the fine tremor returned.

Dr. HENRY HEAD informed the meeting that the complete account of Bárány's observations, which had been referred to, appeared in *Brain* for 1906, p. 383.

Sir WILLIAM GOWERS, in reply, said there was very little which the discussion rendered it necessary for him to refer to. He much regretted that he had no criticisms from the Chairman to answer. He thought he had made the point clear that the absence of muscle-spindles was only an apparent difficulty, since the presence of a branch from each muscle nerve to the fifth nerve showed that afferent impulses must be produced from the muscles, and, of course, structures in the tendons might take part in their production, even if they were not produced within the muscles by some other mechanism or by nerve endings which had not yet been precisely recognized. The question of the relation of infantile nystagmus to nodding spasm was a very difficult one, and he had purposely avoided mentioning it. He did not think the form mentioned was quite the common one, but why nystagmus should be associated with what seemed similar in a wide group of muscles was a difficult problem. It might be, even if the hypothesis he made with regard to the causation of the infantile form was correct, that this was not the only cause. The observations on rotation showed nothing incompatible with the hypothesis, and it was an illustration of those apparent difficulties to which he alluded, and which would probably become less the more the subject was thought over. With regard to the vast subject of tremors and their relation to nystagmus, Dr. Mercier had invited a discussion which he (the speaker) confessed he shrank from at that hour of the night; he would much rather see the subject dealt with on another occasion by Dr. Mercier himself. The observations on anæsthetics were instructive; they were no doubt due to a differing susceptibility to the influence of the poison, putting first out of action some structures that act on the assumed muscle-reflex centre. Nystagmus which occurred only on voluntary movement was not present when a patient was unconscious, and he thought that, in general, nystagmus ceased when consciousness disappeared.

A Note on the Occurrence of Muscle-Spindles in Ocular Muscles.

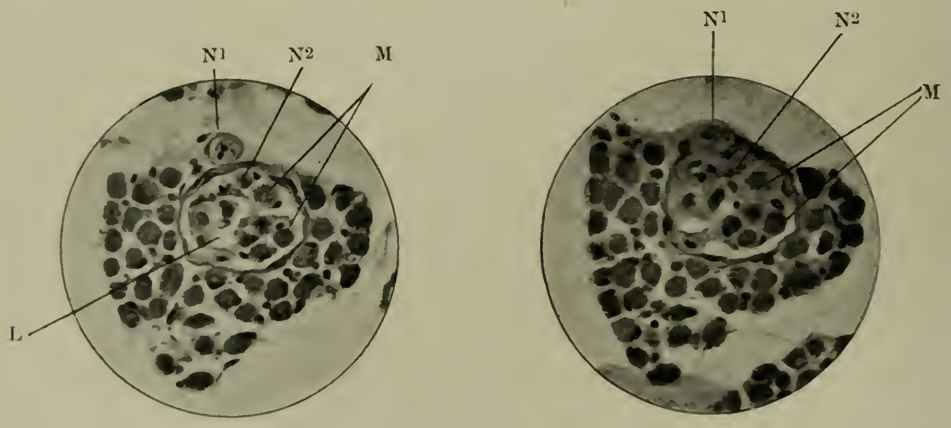
By E. FARQUHAR BUZZARD, M.D.

YOU do not need to be reminded that, although spindles are found in the majority of skeletal muscles, from reptiles upwards, a statement is usually made to the effect that they are absent from the extrinsic muscles of the eyeball. This statement has not only been generally accepted, but it has also occasioned some surprise in view of the high degree of coördination to which ocular movements attain and of the important sensory function with which these spindles are credited. So far as I have been able to ascertain Siemerling is the only observer who has described a spindle in an ocular muscle, an atrophied inferior rectus.

The fact that I am raising this question to-night for reconsideration is due more to accident than to design, as will shortly be explained, and I must plead guilty, before conviction, of bringing forward my work on the subject in a very incomplete condition. While examining a number of ocular muscles in the course of an investigation into cases of myasthenia gravis, my attention was attracted to the occasional occurrence of structures resembling the spindles frequently seen in other parts of the body. I have recently been through my sections again, with additions to their number, and the results of this search are, if not conclusive, sufficiently interesting to stimulate further efforts in the same direction before it is finally decided that the ocular muscles lack sensory organs similar or analogous to those of other muscles.

In order to be as brief as possible I may divide my observations into two parts: (1) The very occasional presence of easily recognized muscle-spindles in ocular muscles, and (2) the possibility that there are modified forms of spindles in ocular muscles as a general rule.

(1) In the accompanying illustrations can be seen micro-photographs of portions of ocular muscles showing muscle spindles in transverse section (figs. 1 and 2). They can be traced through several serial sections; they present the onion-like capsule, the division by septa into compartments containing muscle fibres, nerves, blood-vessels and lymphatic spaces; in fact, they offer satisfactory evidence of being self-contained structures similar to what we know as spindles in other muscles. It is inconceivable, as you will readily admit, that such appearances would have escaped the notice of observers searching for spindles if they were always to be found. Let me hasten to add, therefore, that they are, in my experience, extremely rare, and that in some scores of sections only one or two slides revealed their existence.



(a) FIG. 1. *(b)*

Photographs of the same spindle at levels a short distance from one another in an ocular muscle.

N^1 is an extra-fusal nerve bundle which in *(b)* is being incorporated within the spindle sheath.
N^2 Intra-fusal nerve fibres.
M Intra-fusal muscle fibres.
L Lymphatic space.

Note the equality in size between the intra- and extra-fusal muscle fibres, and the thick sheath, with spindle-shaped nuclei.

This rarity, which is demonstrated also by the fact that only one observer has described a similar case, is capable of explanation on two obvious lines. In the first place we might suppose that an occasional ocular muscle in an occasional individual contains muscle spindles, and that all other ocular muscles do not. In the second place it may be suggested that the specimens I have shown you constitute unusually well-developed spindles, modified forms of which are of more constant occurrence. The first hypothesis does not appeal to me in view of the importance which attaches to these sensory organs, and one hesitates to suppose that Nature is partial in its distribution of them. A pretty theory might, indeed, be built up on this basis, explaining the difference between an individual with "a good eye," which is the popular term for denoting perfect coördination in the movements of the hand and eye, and an individual with "a poor eye," but it will not, I venture to assert, receive serious consideration.

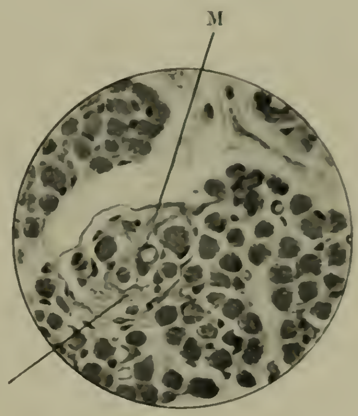


Fig. 2.

Photograph of another spindle from the same ocular muscle.

V A capillary vessel.
M A vacuolated muscle fibre.

The second explanation deserves more attention, and its discussion brings us to the second part of my remarks.

(2) *The Possibility that there are Modified Forms of Spindles in Ocular Muscles.*—My researches on this point have not been exhaustive, but I should like to draw your attention to one or two points. Looking at an ordinary spindle (fig. 3) in one of the limb muscles one is easily convinced that the features by which it is recognized in a transverse section are twofold. The first of these is the presence of a thick,

laminated capsule which cuts it off from the surrounding muscle. The second is the round shape, the small diameter, and the separation of the intra-fusal muscle fibres, which contrast in a striking manner with the more densely packed polygonal-shaped fibres of the extra-fusal type.

Returning to our specimens of ocular muscles, only one of these features is of any distinguishing importance for purposes of attracting attention, and that is the existence of a definite capsule. The intra-fusal fibres, on the other hand, do not differ either in shape or size from the normal ocular fibres in their immediate neighbourhood. If we assume for a moment that the spindles in ocular muscles do not always wear well-defined and thick coats, the difficulty in finding them would receive an ample explanation. It might be suggested that the presence of nerve fibres in close proximity to the muscle fibres would help in distinguishing the spindles, but the extraordinarily rich nervous supply of these muscles is a sufficient answer to this criticism. In support of my assumption I venture to show photographs (fig. 4) which exhibit an arrangement of muscle fibres and nerves within a delicate membrane, and which have suggested to my mind the possibility of muscle-spindles

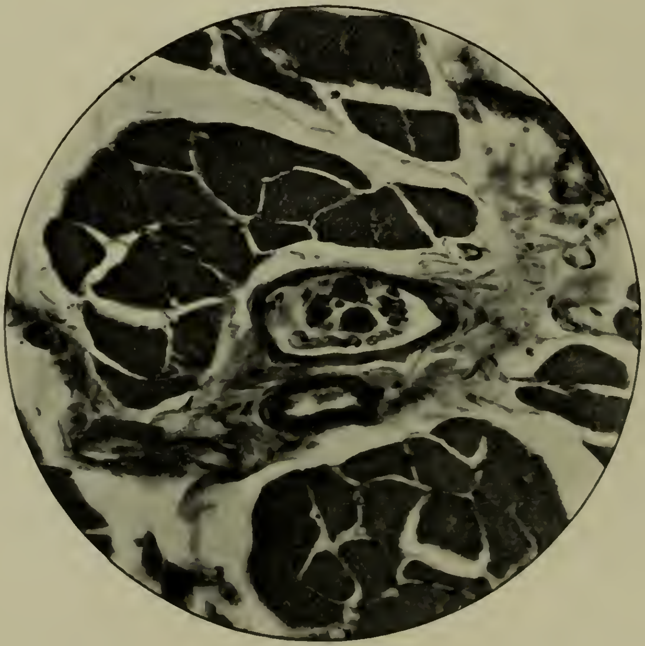
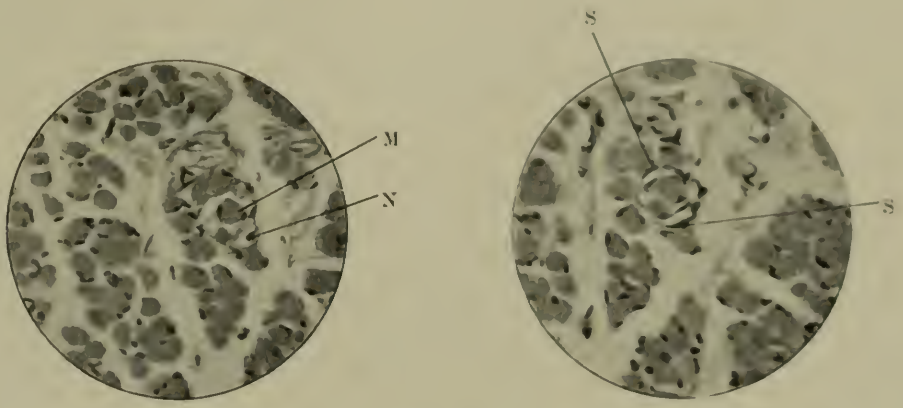


Fig. 3.

An ordinary spindle from a skeletal muscle. Note the thick sheath and the small and rounded intra-fusal muscle fibres, as compared with the large polygonal fibres around.

in ocular muscles not retaining the conspicuous characters we usually associate with those structures. The Sihler method of examining muscles for spindles would hardly be successful with those of the eyeball, owing to the richness of the nerve supply and the consequent abundance of connective tissue. On the other hand, the difficulty of determining the presence or absence of spindles in these muscles, with the exception of the few well-marked examples rarely met with, by ordinary methods can only be appreciated by those who have attempted the task.



(*a*) FIG. 4. (*b*)

Two photographs of the same spindle (?) in serial sections. Note the very fine sheath, with spindle-shaped nuclei (S).

M Muscle fibre.
N Nerve fibre.

DISCUSSION.

Dr. F. E. BATTEN said he was very much interested in the statement made by Dr. Buzzard, who kindly showed him many of the sections when he was doing the work. The appearance of the bodies which the author showed him in the eye muscles certainly suggested the appearance which one would expect in a muscle-spindle. But the great contrast in the muscle-spindle (if it was such), as seen in the eye, and that occurring in skeletal muscles was the difference in the sheath. Dr. Buzzard had described the sheath as comparatively extensive, but, as compared with the sheath in the skeletal muscles, it was very thin. The methods which had been adopted in most cases to find out the presence of muscle-spindles in the eyes had been methods of teasing out the ocular muscles. Anyone who had had experience in teasing out muscle-spindles knew how dependent one was on the thickness and staining of the sheath for their identification. And if the ocular muscle-spindles normally had a very thin sheath, it was readily understood how they could be missed. Certainly in a few ocular muscles which he examined by the teasing method he completely failed to find anything which he could regard as muscle-spindles. Other observers, in lower animals, had carried out their investigations on rather different lines, namely, by examining the form of the nerve termination within the spindle. It was well known that the nerve termination within the spindle was a very characteristic form—the typical spiral form—which he believed was found in no other situation. Observers who had worked at the nerve terminations of eye muscles had described two forms of nerve termination: one called a plaque, like a motor nerve termination, and another the "cluster." So far as he knew, nobody had yet found the typical spiral termination in the ocular muscles. Dr. Buzzard's specimens certainly looked like muscle-spindles. On the other hand, there were differences, and until there was further confirmation, by finding the distinctive end organs, one would hesitate to say that those organs necessarily were the sensory end organs in the ocular muscles. Dr. Buzzard referred to other observers who had found muscle-spindles in the eye, and mentioned Siemerling's paper. He (Dr. Batten) was inclined to doubt the accuracy of this observation, for he described certain muscle fibres surrounded by a stout connective tissue sheath. Westphal, in 1887, made a similar observation, but this was at a time when these bodies were regarded not as sense organs, but as a degenerate form of muscle.

Dr. BUZZARD, in reply, said he was glad to find that Dr. Batten was very much in agreement with him as to the doubt concerning the presence of sensory organs in the ocular muscles. He was interested in what Dr. Batten said about the sheath, because that was the most important thing. If the spindle sheath was not so well formed in ocular muscles, the fact that they had not been found—if they existed—was easily accounted for, and had some bearing on the difference between the two sets of spindles which he showed: those which had definite laminated sheaths and those having poor, ill-defined and thin sheaths.

Neurological Section.[1]

June 18, 1908.

Dr. LEONARD G. GUTHRIE, Hon. Secretary of the Section, in the Chair.

A Case of Syringomyelia.

By H. G. TURNEY, M.D.

A. R., AGED 25; occupation, baker; admitted February 4, 1908. Family history negative; seven brothers and six sisters, all well. Personal history: Always temperate; does not smoke and has never had syphilis; no previous illness.

History of Present Illness.—Three years ago had slight pain in the left thigh, which gradually became more intense, and then attacked the left arm. One year ago he noticed a stagger in his gait, which was worse at night. During the last twelve months the pain in the left leg and arm has become more intense and has been accompanied by a feeling of numbness.

On Admission.—A well-developed man; there is no appearance of illness; the temperature is normal, the pulse 84, the respiration 16. Nervous system: There are no signs of disease in connection with the cranial nerves, with the exception that there is lateral nystagmus and inequality of pupils, the right being larger than the left; moreover, though the palate moves well on phonation the contact reflex is not obtained. Reflexes: Knee-jerks exaggerated on both sides; the plantar reflex is of the extensor type on both sides; ankle- and patellar-clonus on the right side but not on the left; the elbow-jerks are both brisk, more so on the right than the left; the abdominal reflexes are absent on the right side; sphincters unaffected. Motor functions: Patient is a right-handed man, but the grasp on the right side is markedly weaker than on the left, and this weakness applies to all the movements of the upper limb. Nutrition: There is no wasting of muscles, but, on the contrary, the left upper limb is built on a distinctly larger scale than the right; this is particularly visible in the hand, the skin of which, too, is of slightly coarser texture than that of its fellow; there is no apparent change in the vasomotor condition and no œdema. Sensation: There is dissociation of sensation over left half of body and limbs, extending up to line of lower jaw; a light touch with a wisp of wool is felt and localized perfectly *all* over the body, face and limbs; slight differences of temperature, as between 70° F. and 104° F., are not appreciated anywhere on the left half of the body or left limbs; a cold object is generally described as warm. [The two points of a compass are not discriminated on the left half of the body or the upper limb on that side as they are on the right; for example, a recent test gave, on the upper arm (the distance between the points being 1¾ in.), on the right side, 70 per cent. successes, while on the left there were only 10 per cent.; in the forearm (the distance between the points being 4 in.) there were 100 per cent. successes on the right side and only 30 per cent. on the left; in the lower limb no clear difference could be made out].[1] The sensation of pain on the left side is much blunted, whether tested by the prick of a pin or by the application of a test tube filled with boiling water; patient cannot distinguish either hot or cold water; stereognostic sense is perfect, patient telling with perfect accuracy the shape, size, and nature of objects placed in his hand while his eyes are closed; there is no incoördination, and sense of position is perfect; on the right side sensation of every kind is perfectly normal. Gait: Patient tends to stagger in his walk, especially on turning round; he has some difficulty in getting the toes of the right foot clear of the ground; with eyes closed and feet together he falls backwards and to the right; there is marked pes cavus on both sides.

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[1] Meeting held at the Hospital for Epilepsy and Paralysis, Maida Vale.

Subsequent Progress.—The general condition is still as described above, but the following fresh developments have to be noted: A well-marked kyphosis in the cervico-dorsal region, with a compensatory lordotic curve in the lumbar spine; with this an incomplete paralysis of the right serratus magnus, and lastly an atrophy with tremor of the right half of the tongue. He still complains much of pain about the lower part of trunk, extending down the inner aspect of the thighs.

Dr. Head said that in regard to the loss of sensation to the compass test it would be well to make certain about it. Loss of power of discriminating two compass points without any other loss of sensation was almost unknown from a lesion so low down as that of syringomyelia, because at that level—at the point where the peripheral gave place to the intramedullary level—the power of discriminating compasses was closely associated with the impressions of a light touch. If in the same arm as that in which the motor affection existed there was loss of sense of passive position, one would expect the sense of compasses to go, even though there was no loss of touch. He thought it rather a pity to put the compass records into inches, as no other nation used that measure. He presumed Dr. Turney adopted the method of using both singles and doubles. The best way, he (Dr. Head) thought, was to tell the patient he was going to be touched sometimes with one point, sometimes with two, and to mix up the single and double touches quite at random, recording them above and below the line, using a cross if the answer was wrong and a stroke if it was right, so that if twenty stimuli were made ten would be with one and ten with two points. Some people thought that if a man could not tell when he was touched with one point only, calling it "two," he was untrustworthy, but that was not true. When approaching the threshold one point was so like two that it was common for more mistakes to be made with one point than with two. It was important, therefore, to record the errors when one point had been used as well as those made with two points.

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[1] A further and more prolonged investigation failed to confirm this observation, which must be regarded as erroneous.—H. G. T.

Hereditary Spastic Paralysis.

By George Ogilvie, M.D.

J. C., a girl aged 15, was admitted complaining of weakness of the legs, especially the left, and inability to stand or walk alone. Three years ago she was in Paddington Green Children's Hospital for the same condition. She was there noted to be ataxic, and Rombergism was marked.

Family History.—Two sisters have similar difficulty in walking. One of these appears to be a case of infantile hemiplegia. The other walks with a spastic gait, dragging her feet slightly. Both knee-jerks exaggerated, left ankle-clonus.

Present State.—She is quite unable to stand or walk alone. The left leg gives way immediately on attempting to walk. There is weakness of left leg at knee- and ankle-joints, insufficient, however, to account for difficulty in standing. There is left foot-drop with contracture of calf muscles. Both knee-jerks are exaggerated and equal, also extensor plantar reflexes.

DISCUSSION.

Dr. Guthrie said the girl was under his care at Paddington Green Children's Hospital four years ago, and then had difficulty in walking, with marked Romberg's sign. The latter was not now present, or was masked by her other condition. He would be glad to know whether the condition (hereditary spastic paralysis) sometimes occurred in miniature in ancestors or parents, because many years ago he had a family under his care in which three children out of five had spastic paralysis very much of the same nature as in the present girl. He asked the mother frequently whether there was anything in the father which threw light on the condition, and she denied it, stating that he was quite healthy; but inquiry about his gait revealed the fact that he was known among his mates as "Hoppy." He persuaded the husband to come, and found he had a jaunty gait, walking on the tips of his toes; his knee-jerks were exaggerated, and he had double ankle-clonus; but he had never kept away from work, and the condition did not inconvenience him. Possibly some such history might be found in Friedreich's ataxy. He could imagine ancestors going about with nothing wrong except loss of knee-jerks, yet in their descendants symptoms of Friedreich's disease might be apparent.

Dr. HEAD said that in a family published by Dr. Gardiner in *Brain* in 1906 the mother was supposed to be in perfect health, but showed characteristic nystagmus. The children showed most of the signs of Friedreich's disease scattered throughout the family—some had loss of knee-jerks, some had alterations in speech, and so on. In the mother the only abnormal condition found was nystagmus. He was sure that in uncles and aunts and other relatives who were said to be quite healthy the beginnings of the disease would be found. This particular group of diseases required working at from the point of view of heredity, because they did not accord with the Mendelian law. Here we seemed to be face to face with a set of conditions in the nervous system which were transmitted from one generation to another, but not in accordance with any law of heredity at present known.

Friedreich's Disease.

By GEORGE OGILVIE, M.D.

E. M., AGED 18, was admitted on April 10 complaining of inability to walk. This has been coming on since the age of 10, accompanied by a change in speech. Until one year ago she could do her work (weaving), but had to give it up owing to her unsteadiness. About two months ago she lost the power of walking without help altogether.

Family History.—Three sisters: baby, healthy; Edith, aged 7, absence of knee-jerks; Maud, aged 13, healthy.

Present State.—Moderately well-nourished girl. Intellect rather poor. Speech drawling and peculiar. Slight nystagmus on looking to right. Discs normal. No sensory changes noted. Gait awkward and hesitating, but improving. Ataxia of hands in finger to nose test, &c.

Rombergism is present, not very marked. Pes cavus present. No marked scoliosis. Reflexes: Knee-jerks absent. Plantar extension on both sides. Abdominal and epigastric reflexes present.

Locomotor Ataxia.

By GEORGE OGILVIE, M.D.

A. Y., AGED 61. Admitted complaining of difficulty in walking and unsteady gait. This began fourteen years ago with shooting pains in the legs, at first limited to ball of great toe and foot. Has been walking badly for four years. Two attacks of gastric pain with two years interval between. Diplopia for things at a distance for three years. No history of syphilis.

Present State.—This case is now commencing to show marked benefit from mechanical exercises. His present condition can be contrasted with the following note on admission: "Cannot stand or walk without assistance. He walks with typical ataxic gait. Legs are thrown about in all directions, feet raised too high and brought down in a loose-jointed and stamping manner." He appears to be improving daily and walks much better. Knee-jerks absent. Argyll-Robertson pupil present.

Locomotor Ataxia.

By GEORGE OGILVIE, M.D.

J. C., WHEN first seen, was markedly ataxic and had very great difficulty in walking. The manner in which to exercise his limbs was carefully explained to him. The patient, who is very intelligent, has since that time performed the exercises with the greatest care.

Present State.—Walks almost perfectly and his gait would certainly be unnoticed if special attention were not drawn to it. Knee-jerks absent. Pupils do not react to light but do to accommodation.

A Case for Diagnosis.

By GEORGE OGILVIE, M.D.

T. S., ADMITTED for pains in his head which he has had for a year. There is almost constant aching over his forehead on the right side and he is unable to attend to his work. About two years ago he had three fits, apparently typical epileptic fits; he was free from these until about one year ago, when he had about six running. He has had none since. No vomiting.

Family History.—Father had fits.

Present State.—Eyes examined by Mr. Mayou: Right pupil larger than left. Both are inactive to light and accommodation. Fundi are normal. Reflexes are unchanged.

A Case for Diagnosis.

By George Ogilvie, M.D.

H. F., aged 24, was admitted on May 18 complaining of giddiness and difficulty in walking. After walking a little his legs get very tired and his head swims. His great difficulty is in balancing himself. Tends to fall to right. No history of other illness.

Present State.—Reflexes very brisk. Knee-jerks exaggerated, no clonus. Plantar reflex extension on both sides. No Rombergism. Nystagmus on looking to left, with squint and double vision. No sensory changes discovered. Pupils react to light and accommodation. Discs normal.

Dr. Farquhar Buzzard said he had just been over the case, and it seemed to conform to the diagnosis of disseminated sclerosis. The patient had a history, for about two years, of indefinite paraplegia, coming on rather acutely, and passing off or getting rather better, but returning. At present he had nystagmus, precipitate micturition, and a patch of optic atrophy on the outer side of each disc, as well as the spastic paraplegia. The history, the age of the patient, and the clinical signs were all typical of disseminated sclerosis.

Right Hemiplegia following Operation.

By George Ogilvie, M.D.

F. B. was admitted on March 19 for fits and paralysis of right arm and leg. When aged 3 he fell on his head and was unconscious for three days. Since then has had fits. He has an aura, viz., twitching of right arm. He loses consciousness and bites tongue. Enuresis during fit, which almost always occurs at night.

1901: Operation by Sir V. Horsley. Trephined over left motor area. Since then weakness of right arm and leg.

Treated as out-patient from October 21 to December 25, 1907. From October, 1906, to October, 1907, no fits.

December 27, 1907: In daytime sudden loss of consciousness and fell down. No aura. On recovery unable to move right arm or leg. Was taken to infirmary and remained three months. Paralysis improved. He had there one fit similar to the other.

Present State.—Reflexes:—Arm-jerks brisk, right especially so; abdominal reflex diminished on right side; knee-jerks increased; no ankle-clonus. Plantar reflex: Right foot extension, left foot flexion. Muscular power: Weakness of right arm and rigidity; weakness chiefly at elbow- and wrist-joint; fingers contracted. Right leg: Weakness on flexion of thigh and power of dorsiflexion of foot absent. Slight blunting of sensation of right hand.

Patient's condition has not changed to any extent since admission.

Sir VICTOR HORSLEY said the case showed the extreme value of such patients being followed up from hospital to hospital. The boy was admitted into University College Hospital in 1901, and at that date he had right Jacksonian epilepsy, and bromides had no influence over the fits. He was transferred to the surgical department, where he (Sir Victor) trephined him. He found simply white thickenings all along the sheaths of the vessels. He thought at the time that it was either tubercular or congenital syphilis. When he left the hospital he was still having fits. Then, as seen by the history, he was weak in the right arm and leg. He understood that he was treated with bromides as an out-patient, and then came to the present hospital, and was further treated with bromides until the fits ceased. He thought the case was a very good instance of the fact he had previously observed, that bromides had an effect when the intracranial tension had been relieved, when they had had no effect before the opening of the skull. The notes stated that after a fit last December he became completely hemiplegic. The fact was extremely interesting, but it was six years after the operation. The pathology, however, was quite obvious. Seeing what was found at the operation, it was clear that he must suffer from congenital syphilitic endarteritis, and last December he no doubt had an attack of thrombosis, because if his arm were now examined it would be seen that he had typical permanent hemiplegia with secondary changes. He regarded it as a congenital syphilitic case.

Hemiplegia with Involuntary Movements.

By H. CAMPBELL THOMSON, M.D.

THIS case has already been brought before the Neurological Section.[1] The main features are weakness of the left arm and leg, with coarse, involuntary movements when the limbs are moved, and occasional epileptic fits. The general view expressed at the previous meeting was that the patient should be trephined, and this has since been done by Mr. Lenthal Cheatle. Although nothing definite was found, the operation was followed by distinct improvement, which has up to the present been maintained.

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[1] *Proc. Roy. Soc. Med.*, April, 1908, i., No. 6 (Neurol. Sect.) p. 55.

Intracranial Tumour.

By H. Campbell Thomson, M.D.

R. B., aged 22, complains of weakness of the left arm and leg, which has come on gradually during the past two years. He has had no headache; occasionally he has vomited some fluid; eyesight good; no fits; there is some tenderness over the right parietal region. There is distinct weakness of the left arm and leg, and also some weakness of the lower part of the right side of the face, in which the emotional movements seem to have suffered more than those of voluntary origin. There is also an abnormal tendency to laugh and so bring out the emotional movements. The pupils are unequal, the right being larger than the left, and there is nystagmus, which at first occurred only on upward movements, but later in all movements. The vessels of the optic discs are somewhat engorged, but there is no neuritis; the tendon reflexes on the left side are exaggerated. The left superficial abdominal reflex is absent and the left plantar gives an extensor response. A recent development is great pain in the left shoulder with some wasting and increasing weakness of the arm.

A Case of Tumour of the Motor Area of the Brain which was operated upon.

By H. Campbell Thomson, M.D.

The patient suffered from weakness of the right side and Jacksonian attacks, which began in the right foot. There was double optic neuritis. Mr. Lenthal Cheatle operated and found a tumour infiltrating the upper part of the motor area of the left side of the brain. This was removed and the patient has made an excellent recovery.

DISCUSSION.

Dr. GUTHRIE said, in regard to the first case, that the man was kicked over the heart by a horse in South Africa two or three years ago and rendered unconscious. Two months later he was seized with epilepsy affecting the left side, and the question was whether the injury could be associated with the subsequent epileptic fit. He (Dr. Guthrie) thought that the kick probably caused some injury to his heart, which set up thrombosis in one of its cavities, and that the fit, followed by movements on the left side, was due to a thrombus swept from the heart into some cerebral vessels, and that therefore there was some thrombosis about the cortex or subcortical region, which accounted for the epileptic fits and the condition of his arm. He was trephined, but nothing was found; yet the explanation submitted might be the correct one. He was immensely improved since the operation.

Dr. GORDON HOLMES said he could not agree with what had been said. He believed the case was previously shown as a hemiplegia associated with tremor, and was compared with one shown by Dr. Batten. He would not call the involuntary movements in the latter case tremor, as by tremor he meant the oscillation of any part of the body round any point, due to the alternate contraction of the muscles and their antagonists. In Dr. Batten's case there was only clonic movement, chiefly of the flexors of the wrists and fingers: the recoil was due to gravity or the normal tension of the tissues, but never to the active contraction of the antagonists. In Dr. Thomson's case, however, he had that day seen definite tremor-like movements; for instance, in the forearm there was a very pretty tremor like the movement of flexion and extension of the elbow. Such cases as Dr. Batten's, with definite clonic movements, he thought were always due to lesions in or near the cortex, and the course of Dr. Batten's case made that localization very probable. In one similar case he found a small tubercular tumour in front of the hand area; in another, a case of juvenile general paralysis of the insane, there was a small area of softening in front of the hand area. He had collected some cases in which the most prominent symptom was tremor of hemiplegic distribution. The evidence in all such recorded cases seemed to be in favour of a lesion of the subthalamic region. At the time he published that paper only two of his nine cases had died, and in these two the lesions were in that region. Since then three or four cases had died at Queen Square Hospital and in each the lesion was in the same region, in one being limited to the red nucleus. Further, the hand of Dr. Campbell Thomson's patient occasionally assumed an athetotic attitude, with hyperextension of the first inter-phalangeal joints, and he had never seen that condition associated with a cortical lesion. In looking through the literature of tremor associated with local organic lesions he had failed, as had also others, to find a case in which there was disease of the cortex alone. He would have been surprised if any disease had been found in the motor region of the cortex in this case.

A Case of Paralysis agitans.

By Wilfred Harris, M.D.

A. P., female, aged 56, admitted complaining of tremor, especially of left arm and leg. First noticed that she trembled and dragged her foot in April, 1907. The trembling was confined to her left side. She became very lame after a severe bout of diarrhœa and vomiting. The tremor is much worse on voluntary movement, and stops her from doing her work. On examination: Thin, ill-nourished woman; typical paralysis agitans facies. Some tremor is noted, especially of left arm and leg. This is greatly increased on movement. The gait is a peculiar one and she limps markedly on her left leg; this she ascribes to the trembling and also to the fact that the leg feels tired and heavy on exertion.

A Case of Right-sided Extra-cerebellar Tumour.

By Wilfred Harris, M.D.

A man, aged 42, has had giddiness and noises in the head with progressive deafness in the right ear for the last three months, with frequent vomiting. No headache or optic neuritis. Gait very unsteady, falls to right. Marked nystagmus, especially to right. Anæsthesia over whole of right fifth nerve, but no weakness of the motor fifth. Partial nerve deafness right ear, but aerial conduction worse than bone conduction. Deep reflexes unaltered. Some ataxy of arms, especially right.

Cerebral Degeneration with Changes at the Macula in four members of a family.

By M. S. Mayou, F.R.C.S.

W. K., aged 7, male, is the fourth and youngest member of a family of seven to be affected with the disease.

Family History.—The patients are the children of first cousins. A doubtful specific history was given by the mother. No history of insanity in the family, except that the father's brother was very "dull" as a child (now in the Navy). Married fifteen years. Order of pregnancies: (1) Miscarriage at three months (mother had, at this time, a severe sore throat); (2) R. K., now aged 14 (affected, in Darenth

Asylum); (3) L. K., now aged 13 (affected, in school for defective children); (4) B. K., aged 8 (affected, in school for defective children); (5) (6) healthy children; (7) patient. (Nos. 2, 3, and 4 were shown at the Ophthalmological Society in 1904.)

Personal History.—Always a bright, intelligent boy until eighteen months ago, when it was noticed at school that his sight began to go and he became "dull."

Present Condition.—Dull, stupid boy. Pupils: Equal, active to light, but sluggish. Vision:

Right and left: $\begin{array}{c|c} & +4\cdot5 \\ \hline & +4\cdot5 \end{array}$ Right and left: $+4 = \frac{6}{36}$

Media clear. Fundi: The outer half of the discs is pale; at the macula of each eye (more marked in the left) is a coarsely granular condition of the retinal pigment; there are no changes elsewhere in the fundi.

Remarks.—The patient shows the early stage of a disease which seems to have very definite clinical features. Similar cases have been recorded by Batten, Still and Gunn, Hirschberg, Hutchison, Stephenson, and Mayou. The chief points in the cases are: (1) A history of syphilis and consanguinity in the parents; (2) the simultaneous onset of the ocular and mental conditions between the ages of 7 and 14; (3) the loss of central vision; (4) the typical appearance of the macula above described; (5) the disease progresses until all central vision has been lost, the patient developing a crab-like walk as the result; the optic discs become atrophic and the mental condition deteriorates.

DISCUSSION.

Dr. GUTHRIE asked whether the author thought the cases bore any analogy to "amaurotic family idiocy." Had all the cases of amaurotic family idiocy recorded been in Jews?

Dr. GORDON HOLMES asked if those cases now shown were similar to those which had been published by Spielmeyer and by Gordon. It was interesting that in Spielmeyer's cases the histological changes in the central nervous system were very similar to those which were characteristic of amaurotic family idiocy. But that was not an argument that the conditions were identical, except when combined with clinical similarity. Spielmeyer pointed out that in his cases there was a history of congenital syphilis, as there was in this case. No cases of amaurotic family idiocy had been known to be associated with syphilis.

Mr. MAYOU, in reply, said he did not think there was any analogy between these cases and amaurotic family idiocy, the latter generally coming on at an earlier age, not having the same clinical features, and in Jews; these children were not Jews. The age of onset was 7 years. The first indication of the onset of the condition was that they were sent down in their form at school. In reply to Dr. Guthrie, as far as he knew all the cases of amaurotic family idiocy had been in Jews.

Ischæmic Disturbance of the Right Upper Extremity.

By F. Parkes Weber, M.D., and E. Michels, M.D.

The patient, A. K., aged 52, is a Russian Jew, who has been thirty-five years in England. There is dry gangrene (not progressing) of the tip of the right thumb with sharply defined demarcation line; the whole of the right hand is swollen, somewhat cyanosed, and of a dusky red colour, and it feels colder to the touch than the left hand; there is great weakness and limitation of movement in the hand and wrist, but the least active movement in the affected extremity (flexion and extension of the elbow-joint) causes the skin of the hand to become at once paler;[1] there is considerable wasting of the soft parts of the whole extremity up to the shoulder, not including the region of the deltoid muscle; there is no anæsthesia (for touch, pain, heat or cold); faradic irritability is diminished in the muscles of the front of the right forearm, but galvanic stimulation shows no reaction of degeneration anywhere. The pains of which the patient complains in the hand and forearm have been usually worst at night time; no pulsation can be detected in any of the arteries of the limb distal to the subclavian artery, and the pulsation in that artery is less than in its fellow on the left side. Röntgen ray examination (Dr. A. H. Pirie) shows that there is no aneurysm present and that there is no cervical rib or deformity of the clavicle. There is no evidence of disease elsewhere in the body,[2] but the arterial blood-pressure is abnormally high; measured in the left arm by the Riva Rocci apparatus with broad band the systolic blood-pressure is 180 mm. of mercury. The urine, of specific gravity about 1016, is free from albumin and sugar. The patient's family history in regard to longevity is fairly good; he himself has generally enjoyed good health up to the present illness, which commenced early in February of this year. On

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[1] When the case was shown the appearance had somewhat altered owing to increased œdema of the hand, which was probably partly due to subcutaneous injections of fibrolysin into the affected extremity.

[2] Excepting that ophthalmoscopic examination (Dr. Gruber) shows the presence of some small white spots in both retinæ, chiefly in the region of the macula. No optic neuritis. No retinal hæmorrhages. The changes are not those of ordinary "albuminuric retinitis."

February 3 he somehow knocked his right thumb, and a day or two afterwards he began to feel pains in the right hand and forearm; about February 12 the ends of the fingers, and especially of the thumb, began to look dusky; the symptoms have not lately been progressive. Two years ago he was told that he had sugar in the urine, but this was not detected at later examinations. There is no history of any venereal disease, but the patient admits that he has indulged freely in whisky (about half a pint in the day) and cigarettes (about forty in the day). Many cases of arterial obstruction in the upper extremities have been explained as due to embolism, but, owing to the rather gradual onset of the symptoms, embolism is unlikely in the present case, and no probable source for an embolus can be ascertained by examination of the heart and aorta. The obstruction is more likely to be due to disease of the main artery of the limb with secondary thrombosis. This explanation would account for the mode of onset of the symptoms and for the apparently abnormal condition of the subclavian artery (as shown by its deficient pulsation) proximal to the obstruction. Moreover, the excessive arterial blood-pressure in the other (left) arm to some extent supports the hypothesis of a degenerative arterial disease. Possibly compensatory collateral circulation had already been considerably developed before the axillary artery was finally occluded. Arterial obstruction can proceed to a considerable extent in the upper extremity without giving rise to any subjective symptoms, as shown in a former case, described by Michels and Weber,[1] in which the left radial artery was diseased in addition to the arteries of both lower limbs. The present patient has been treated with hypodermic injections of fibrolysin, and since he has been under observation in the hospital the pains have considerably diminished in severity.

Arteritis obliterans of Right Upper Extremity associated with Malformation of both Clavicles.

By Leonard Guthrie, M.D.

A woman, aged 42, has suffered for three years from attacks of pain, coldness and numbness of the right fingers, hand and forearm. Seven months ago painful whitlows formed on all the fingers, leading to loss of the nails and part of the substance of the finger-tips. At the same time absence of the radial and brachial pulses of the right arm was noticed, but pulsation could be felt in the axillary artery. The right fingers and hand became at times cold and bluish white. Pain is only experienced on using the hand and limb, especially if she elevates them, as in hanging up clothes or doing her hair.

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[1] *Brit. Med. Journ.*, September 12, 1903, ii., p. 566, Case 1.

Skiagrams show that both clavicles are divided at about their centres; there is much displacement and no bony union of the fragments. No history of accident can be ascertained. The condition is probably a congenital malformation; its relation to the obliteration of the brachial artery and its main branches is not clear. The patient has complained of numbness and tingling in the left hand also. She is not a Jewess, and there is no history of syphilis.

DISCUSSION.

Dr. GUTHRIE added that six weeks ago there was no affection of the left side, but three weeks later she began to have severe pain, similar to that on the right side, on the left. There were some alterations of colour in the left hand, and now there was no trace of left radial or brachial arteries. The axillary on both sides could be felt. He did not think the malformation of the clavicle had anything to do with the condition because, although the pulsation of the vessel below the axillary was entirely absent, the axillary artery itself could be distinctly felt beating, and if there had been pressure on the vessel above that could not have been so. He regarded it primarily as a case of vasomotor spasm affecting peripheral vessels. No doubt some arteritis was present, which led to thrombosis, terminating in obliteration. In most cases there was a history of syphilis, and the patients were Jews. The present patient, however, was not a Jewess and had not suffered from syphilis.

Dr. PARKES WEBER said Dr. Guthrie's patient showed a point which his own and Dr. Michels' patient did not show at the present moment owing to the œdema of the hand in the latter case (partly due to the local fibrolysin injections). He referred to the pallor in the hand produced on moving the affected extremity. In regard to the abnormality in the clavicles in Dr. Guthrie's case, he thought that it belonged to the group which had been called "cleido-cranial dysostosis." In that group of cases the defective ossification might, as in Dr. Guthrie's case, be limited to the clavicles. The cranial abnormality was, he thought, of rarer occurrence, though it probably might occasionally be present without any accompanying defect in the clavicles.

Dr. FARQUHAR BUZZARD asked what explanation Dr. Guthrie gave of the condition, as to him it offered considerable difficulties. He did not know how vasomotor spasm, which was capable of obliterating pulsation as high up as the axillary artery, could exist and yet practically the whole of that limb be warm and natural until the finger-tips were reached. Was it clear that the fact that the axillary vessel could be felt pulsating was an argument against there being pressure on the vessel above that point? He thought the defect in the peripheral circulation was more likely to be caused by pressure in the proximal part of the arterial system than by vasomotor constriction throughout its length.

Dr. GUTHRIE, in reply, said he had not regarded the case as due solely to vasomotor spasm extending up to the axillary artery. He thought it was parallel with the conditions often seen in women at the climacteric, one bordering on Raynaud's disease, in which the peripheral vessels were affected by spasm. He also thought there was arteritis, the combination leading to thrombosis, extending to the axillary artery on both sides. Cases of obliterative arteritis in the lower extremities attended by "intermittent claudication" were analogous. If the condition were due to pressure above the axillary, he could hardly believe that pulsation in the axillary artery would be so pronounced as it always had been.

Functional Trismus.

By LEONARD GUTHRIE, M.D.

G. A. L., MALE, aged 32, admitted complaining of stiffness in neck and inability to open mouth. Ill four years. First thing noted was a hæmorrhage from lungs; he went to a convalescent home and got better, but as he did so noted a tightness across his chest; his legs began to shake as he walked and he stooped over. First noticed inability to open mouth two and a half years ago; with this came marked stiffness of neck.

On examination, patient is a moderately nourished man. The right side of his head is drawn towards the right shoulder, whilst his face is turned upwards to the left; the muscles of the neck are in a state of contraction; the mouth is tightly closed and he speaks through his teeth; the head is bent and the general attitude is a stooping one; the arm movements are stiff and awkward. He is reacting markedly to treatment by faradism.

A Case of Intracranial Tumour.

By D. W. CARMALT JONES, M.B.

H. H., AGED 43, ironworker, complains of mental dulness (inability to understand questions, unsatisfactory carrying out of work), persistent severe headache (referred to back of right eye), and occasional vomiting without preceding nausea.

Previous History.—Contracted syphilis some years ago; has been very deaf in both ears, especially right, for years, this being attributed by patient to his trade.

Present Condition.—Special senses:—Hearing: double nerve deafness, much more advanced in right ear (Mr. Biggs); Sight: normal; fields—

slight general contraction on right, irregular contraction on left; Disc: double optic neuritis (left slightly more intense than right), + 3, veins congested, arteries normal, no hæmorrhages (Mr. Bickerton). Cranial nerves: No abnormality, except slight inconstant analgesia R.V.; no nystagmus. Musculature: Nutrition fair, no wasting, tone normal, all movements performed with fair power and precision (*see* below) through normal range. Sensation: Headache; nothing else subjective. Objective: Face, as above; slight inconstant analgesia on left side of body, below fifth division. Reflexes:—Superficial: abdominal brisk throughout; plantar flexor; right ≐ left; Deep: all brisk, slightly more than normal; no clonus; right = left; sphincters normal. Coördination: Romberg's symptom; walks on wide ataxic base with general unsteadiness; fine tremor of hands; right = left in any direction; in the finger to nose test, with eyes shut, he misses the object by 3 in. to 4 in.

DISCUSSION.

Dr. FARQUHAR BUZZARD said a man came into hospital under his care with fifth and eighth nerve symptoms, and the question arose whether it was tumour at the base of the brain or one of the base of the skull itself. It occurred to him, as a result of that case as well as of another he had had, that one point of importance in diagnosis was the affection of the motor fifth as compared with that of the sensory fifth. It was uncommon to find the motor fifth early affected with intracranial tumours; sensory symptoms were more common, whereas in tumours involving the base of the skull, beginning in the sphenoid, the motor fifth was frequently markedly affected, even before there was much sensory loss. Certainly two cases of that kind, in which there had been disease at the base of the skull, and which had come to post-mortem examination, had not been syphilitic in origin.

Dr. CARMALT JONES, in reply, said there was no change in the reflexes; the abdominal reflex was brisk down to the lower part of the abdomen; the knee-jerks were brisk and equal, and ankle-jerks also. There was no clonus, and the plantar response was flexor on each side. The aural surgeon really said there was double nerve deafness, but he did not refer that to the patient's occupation, stating that in his experience the deafness due to trade was symmetrical, and it was unusual to get one side so much more affected than the other, as in this case. That surgeon told him of a case which was operated upon, and finally came to the post-mortem room, and in which there was a tumour of the eighth nerve. In that case there was just that condition of double nerve deafness increased on the side of the lesion, but there were signs of involvement of the pons which were not present in the case now shown.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE FIRST

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1907-8

OBSTETRICAL AND GYNÆCOLOGICAL SECTION

MCMVII

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1908

LONDON:

JOHN BALE, SONS AND DANIELSSON, LTD.,
OXFORD HOUSE,
GREAT TITCHFIELD STREET, OXFORD STREET, W.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE

OBSTETRICAL AND GYNÆCOLOGICAL SECTION.

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The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

Obstetrical and Gynæcological Section.

October 10, 1907.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

A Case of Cæsarean Hysterectomy for Traumatic Atresia of the Vagina, the Patient having previously undergone a Successful Operation for a Vesico-vaginal Fistula due to the same Injury.

By AMAND ROUTH, M.D., F.R.C.P.

OBSTETRIC PHYSICIAN TO CHARING CROSS HOSPITAL, ETC.

THE patient was first admitted to Charing Cross Hospital on March 21, 1906, having been delivered of her seventh child fifteen days before. She had been attended by a midwife, who, apparently mistaking an œdematous anterior lip for the placenta, had dragged on it for two hours, and, after a rest, for another two hours, causing acute agony. Eventually the midwife pulled away "two lumps of flesh," as the patient called it, and said it was a growth. A doctor was sent for. The patient survived, but since the confinement her urine had all passed by the vagina.

On examination, the middle part of the posterior cervical lip was present, but the whole of the anterior lip and the lateral ends of the posterior lip were absent. The anterior and lateral vaginal wall in front of the cervix was missing for about two inches, and when the parts were exposed by a Sims's speculum there was seen to be an opening into the bladder about $1\frac{1}{2}$ by 1 inch in area. The anterior wall of the vaginal and supra-vaginal cervix was absent up to about the level of the internal os; the utero-vesical pouch of peritoneum was apparently not opened. The intra-uterine sound passed along the posterior uterine wall 3 inches, along the anterior an inch and a half.

The urine was offensive and contained much mucus and pus. This condition cleared up after repeated vesical irrigation by boric acid solution and administration of urotropin and acid phosphate of soda. The patient then returned home for five weeks till the involution of the parts was complete.

July 20, 1906.—With valuable advice from Mr. Stanley Boyd, and assisted by Mr. J. W. Heekes, then my Resident Obstetric Officer, I dissected off the bladder from all its attachments (without, however, opening the utero-vesical pouch of peritoneum) and drew it down into the vagina like an empty sac. I could then see the right ureteric opening, but not the left. This dissection necessarily afforded both a vesical and a vaginal flap. I united the bladder opening transversely by a series of interrupted catgut Lembert sutures, tucking the margins of the opening inwards into the bladder. By injection of sterilised milk the bladder was proved not to leak. The vaginal flaps were then, as far as was possible, drawn over the sutured bladder and united by interrupted fishing-gut sutures, the line of suture being longitudinal instead of transverse. On the twelfth day the silkworm gut vaginal sutures were removed, and the patient left the hospital on the eighteenth day (August 7, 1906) cured. She was instructed to report herself at the hospital if she missed a period.

She reported herself, when a week overdue, at the end of October, 1906 (three months after the operation), but pregnancy did not then seem likely. The bladder at its junction with the vagina was lying against the anterior surface of the posterior lip of the cervix, with a small space between, permitting the escape of the uterine secretions.

On July 11, 1907, she was again admitted into Golding Ward of Charing Cross Hospital, being then in labour. My Resident Obstetric Officer, Mr. J. B. Banister, had made out that the child was presenting in the first position of the vertex; the membranes had ruptured and the pains were feeble. He ordered a sedative, and I saw her in the early afternoon.

On examination, the remaining portion of the posterior lip of the cervix was found to be œdematous, and the head could be felt pressing down on to the anterior ridge of tissue formed by the united bladder and the vaginal wall. The lower edge of the anterior uterine wall above the bladder could not be felt. It was evident that if the head were allowed to come down further the bladder would be severely and probably irremediably torn, so I decided to perform Cæsarean section.

This I did in two hours' time, assisted by Dr. Eden and Mr. Banister. Before making the incision into the uterine wall a ridge was noticed on its surface crossing obliquely from above downwards, but this was not recognised as a fibroid till the uterine wall had been partly divided. It was then found that at the point incised the uterine wall was nearly 3 inches thick, and it was evident I had cut into a large fibroid which had undergone "flattening out and softening," the "assouplissement" described by Depaul.

The child was removed by podalic version and was taken charge of by Mr. J. W. Heckes, and its cries soon proclaimed that it was vigorous.

As the patient and her husband were most anxious that she should be spared the risk of another confinement, I had considered whether I should perform hysterectomy or procure sterility by removing both Fallopian tubes and inverting their uterine stumps, but as the incision had been made through the tissue of a fibroid, which would have made the uterine sutures both insecure and dangerous, I decided to adopt the standard operation and to sterilise her by removing the uterus by the subtotal method. Amputation was performed just above the level where the anterior uterine wall had been torn away by the midwife. I had intended to leave one ovary, but such extensive sub-peritoneal venous hæmorrhage occurred whilst I was dealing with the second ovary that I had to remove it. The abdominal wound was closed in layers by continuous catgut sutures for the peritoneum and anterior rectal sheath, and by interrupted catgut sutures for the fat; the skin was united by a silk subcuticular suture and covered by collodion gauze. The patient made an excellent recovery and was able to suckle the child. The wound healed beautifully. The child, which weighed 4 lbs. 12 ozs. at birth, lost 4 ounces the first week, but gained 10 ounces the second, and 14 ounces during the third week. The child had an attack of conjunctivitis from July 13 to 19. The patient left the hospital on August 3, the twenty-fourth day after the operation.

Remarks.—The indication for some variety of Cæsarean section in this case was clear and absolute. The child could not have been born, alive or dead, without very serious injury to the bladder and vagina, and it is almost certain that the resulting injury to the bladder would have been irremediable.

I can find only records of two instances of a simple or conservative Cæsarean section having been performed in this class of case (non-malignant cicatricial atresia) since 1876, when Porro first performed subtotal hysterectomy (Cases 31 and 32 in Table).

A conservative Cæsarean section is contra-indicated where much vaginal atresia exists, owing to the probability of retention of lochia and the development of sepsis, and owing to interference with normal involution.

The question and method of sterilisation must also be carefully considered, and the patient and her friends should be informed of the advisability of preventing another conception. In this case, having decided to sterilise the patient, and having unwittingly made the uterine incision through the substance of a fibroid, I had no alternative but to perform hysterectomy, which, however, I am convinced would in any case have been correct treatment.

It is owing to the dangers of a conservative Cæsarean section in these vaginal atresia cases, and to the advisability of ensuring certain sterilisation, that operators have been led to perform some variety of hysterectomy as the best means of safeguarding the patient both at the time and in the future.

I append a table of thirty cases of Cæsarean hysterectomy for vaginal atresia, in five of which (Nos. 22, 23, 28, 29 and 30) injury to the bladder had occurred at the previous labour and had been operated upon subsequently, in one case (No. 29) unsuccessfully.

The maternal mortality in the 30 cases was six, or 20 per cent. Five out of the six deaths occurred in the cases in which the stump was treated extra-peritoneally, the mortality being 5 in 18 cases so treated, or 27·7 per cent. No. 22, treated by pan-hysterectomy, died from hæmorrhage from slipping of a ligature. The 11 cases treated by the intra-peritoneal method all survived. The five deaths, in the cases Nos. 1, 2, 7, 25, 26, where the stump was treated extra-peritoneally, could, however, hardly be put down to the method employed.

Nos. 1 and 2, quoted by Godson in his paper of 1885, occurred in 1880, when hysterectomy was in its infancy, one patient dying of septic peritonitis, the other from hæmorrhage from the stump. No. 7 (1886) also died of septic peritonitis. No. 25 had been in labour for twenty-four hours, and had had much vaginal manipulation by other medical men before operation; she died of pneumonia on the twelfth day.

No. 26 was feverish during labour; peritonitis developed, and the patient died after the abdomen had been reopened three weeks after the hysterectomy.

Of the thirty children, twenty-five are stated to have survived.

The statistics of the operation, and the above considerations, seem to prove that Cæsarean hysterectomy with intra-péritoneal treatment of the stump is the most suitable operation in cases where there is much obstruction from vaginal atresia, or where the bladder is likely to be seriously damaged.

The operation should be performed, after due preparation, at or near full term, and, if labour has already commenced, with as little delay as possible.

Cases of Cæsarean Hysterectomy, with Table of References.

No.	No. in Porro-Cæsarean Memoir	Date	Name of Operator	Para.	Remarks	Result		References
						Mother	Child	
1	54	1880	Laroyenne (Lyons)	II.	Vaginal atresia. Extra-peritoneal treatment of pedicle	D	L	Godson, *B.M.J.*, 1885.
2	74	1880	De Rull (Barcelona)	II.	Vaginal atresia following preceding labour. Extra-peritoneal treatment of pedicle	D	D	*Ibid*
3	113	1882	De Jace (Liége)	II.	Vaginal atresia following gangrene in previous labour. Operation, extra-peritoneal	L	L	*Bull. de l'Acadèm. roy. de Méd de Belgique*, tome 16, n. 11.
4	189	1885	Omori (H.) mada Y Ikeda (Japan)	II.	Vaginal cicatricial stenosis. Operation, extra-peritoneal	L	L	*Centralb. f. Gyn.*, 1893, n. 46, p. 1,060.
5	195	1885	Lesi (Imola)	I.	Stenosis vaginæ. Operation, extra-peritoneal	L	L	*Il Raccoglitore medico*, n. 7, 1885.
6	209	1885	Weiss	IV.	Stenosis vaginæ. Operation, extra-peritoneal	L	L	*Archiv f. Gyn.* Bd. xxviii, Hft. 1.
7	250	1886	Nicolini (Milan)	II.	Vaginal atresia. Operation, extra-peritoneal	D in 7 days	L	Truzzi, *Annali di Ostetricia*, 1890.
8	265	1887	Schauta (Prague)	I.	Vaginal atresia. Operation, extra-peritoneal	L	L	*Zeitsch. f. Heilkunde*, Bd. ix., 1888, pp. 105-128.
9	268	1887	Frattina (Pordenone)	Multi	Vaginal cicatricial atresia. Operation, extra-peritoneal	L	L	Truzzi, *op. cit.*, 1890.
10	270	1887	Schauta (Prague)	II.	Vaginal atresia. Operation, extra-peritoneal	L	D	Same as No. 265.
11	325	1889	Späth (Hamburg)	II.	Vaginal cicatricial stenosis. Operation, extra-peritoneal	L	L	*Münch. med. Woch.*, 1889, n. 44.
12	361	1890	Mangiagalli (Milan)	VIII.	Vaginal cicatricial atresia. Operation, extra-peritoneal	L	L	*Annali di Ostet. e Gin.*, 1890.
13	394	1890	Ashton, W. (Philadelphia)	I.	Congenital stenosis of vagina. Operation, extra-peritoneal	L	L	*Med. News*, Philadelphia, 1891, p. 369.
14	1061	1892	Fritsch (Breslau)	III.	Cicatricial stenosis of vagina. Operation, intra-peritoneal	L	L	Caruso, *Annali di Ostetricia*, 1892-1894, p. 189.
15	601	1894	Ogata (Japan)	—	Cicatricial stenosis of vagina. Operation, intra-peritoneal	L	L	*Zeitsch. f. Geb. u. Gyn.*, Bd. xlv., Hft. 2.
16	623	1895	H. Spencer (London)	VI.	Cervico-vaginal stenosis following amputation of cervix for cancer in 1893. Operation, extra-peritoneal	L	L	*Trans. Obst. Soc.*, London, vol. xxxviii. for 1896, p. 389.
17	679	1896	Chrobak (Vienna)	II.	Vaginal stenosis. Operation, intra-peritoneal	L	L	*L'Operazione cesarea*, Porro, No. 679.
18	748	1897	Kumagai (Japan)	—	Cicatricial stenosis of vagina. Operation, intra-peritoneal	L	L	*Zeitsch. f. Geb. u. Gyn.*, Bd. xlv., Hft. 2.
19	759	1897	Fehling (Halle)	III.	Cicatricial stenosis of vagina. Operation, intra-peritoneal	L	D	*L'Operazione cesarea*, No. 759.

CASES OF CÆSAREAN HYSTERECTOMY—(*continued*).

No.	No. in Porro-Cæsarean Memoir	Date	Name of Operator	Para.	Remarks	Result		References
						Mother	Child	
20	815	1898	Tolotchinof (Kharkoff)	XIII.	Cicatricial stenosis of vagina. Operation, extra-peritoneal	L	L	*Annali della Univ. di Kharkoff*, 1898.
21	868	1898	Kusuda (Japan)	—	Cicatricial stenosis of vagina. Operation, intra-peritoneal	L	L	*Zeitsch. f. Geb. u. Gyn.*, Bd. xlv., Hft. 2.
22	869	1898	Routier (Paris)	III.	Uretero-cysto-neostomia. Cicatricial stenosis of vagina following previous forceps delivery. Pan-hysterectomy	D in 3 days	L	*Comptes rendus de la Soc. d'Obst. de Gyn. de Pediat.*, t. iii, p. 47.
23	927	1899	Roncaglia (Mantua)	IV.	Vesico-vaginal fistula and stenosis vaginæ in previous labour. Operation, intra-peritoneal	L	L	*L'Operazione cesarea*, No. 927.
24	953	1900	Ogata (Japan)	—	Cicatricial stenosis of vagina. Operation, intra-peritoneal	L	L	*Zeitsch. f. Geb. u. Gyn.*, Bd. xlv., Hft. 2.
25	958	1900	Boari (Pescia)	—	Cervico-vaginal atresia following previous gynæcological operation. Operation, extra-peritoneal	D in 12 days	L	*Resoc. Clin. Statistico della Sez. Chirurg. del R. Ospidale di Pescia.*
26	993	1900	Kühne (Marburg)	III.	Cicatricial atresia of vagina. Operation, extra-peritoneal	D in 3 wks.		*L'Operazione cesarea*, No. 993.
27	997	1900	Riedinger (Brunn)	III.	Cicatricial stenosis of vagina. Operation, extra-peritoneal	L	L	*Ibid.*, No. 997.
28	1041	1901	Pestallozza (Florence)	III.	Cicatricial stenosis of vagina. Vesico-vaginal fistula in first labour. Repaired in 1900. Operation, intra-peritoneal	L	L	*Ibid.*, No. 1041.
29	—	1904	Fournier	II.	Cicatricial stenosis of vagina. Two unsuccessful operations for vesico-vaginal fistula	L	D	*L'Obstét.*, March, 1904.
30	—	1907	Routh, A. (London)	I.	Cicatricial stenosis of vagina in previous labour, with vesico-vaginal fistula repaired in 1906. Operation, intra-peritoneal	L	L	—

CASES OF SIMPLE CÆSAREAN SECTION.

31	—	1902	Van Doort-Kroon	VII.	Vaginal atresia following craniotomy. Conjugata vera $3\frac{1}{2}$ in.	L	—	*Monats. f. Geb. u. Gyn.*, June, 1902.
32	—	1907	Muratow (Kief)	—	Vaginal atresia. Uterus bicornis	L	L	*Zentralb. f. Gynäkol.*, 1907. *Journ. of Obst. and Gyn. of British Empire*, Sept., 1907, p. 228.

The President said he agreed with the author that the extensive cicatrisation involving the bladder furnished a clear indication for Cæsarean section, to be followed by hysterectomy. He had seen very extensive vaginal cicatrices yield to the pressure of the head in natural delivery, but in Dr. Routh's case this would have entailed great risk of injury to the bladder. He would prefer total hysterectomy, if practicable, to supravaginal hysterectomy, on account of the free drainage which it afforded.

Œdematous Fibroma of Pelvis.

Shown by Dr. Walter Tate.

E. S., aged 39, was admitted to St. Thomas's Hospital with the following history: Fourteen years before admission she had suffered from hæmoptysis, and for some years past had been troubled with bronchitis. Menstruation began at the age of 11; its duration was four to five days, and it was not excessive. The patient was married fourteen years ago, and has had five children, the last having been born six years ago. At the time of the second labour, twelve years ago, some difficulty arose during delivery owing to a swelling which protruded at the vulva; this swelling was pushed back, and the head delivered past it. The same trouble arose at the three subsequent confinements. Whether the obstruction to the passage of the child was due to the presence of a cystocele, or whether the pelvic tumour recently removed was the cause of the difficulty in delivery, is not quite evident from the history, but it seems very probable that the tumour was the cause of the obstruction. Since the last confinement, six years ago, the patient has noticed enlargement of the abdomen, which has steadily increased in size, and she also found that she was unable to micturate, if she delayed long in doing so. The catheter had to be used on several occasions. There has been aching pain in the abdomen for several years past, which has sometimes been very severe, and during the same time the periods have recurred every three weeks and have lasted longer than before. The patient had to give up work three months ago.

Patient was admitted to St. Thomas's Hospital on July 7, 1907. She was a thin, delicate-looking woman of 39, with rather a sallow complexion. There was some dulness at the apices of both lungs, but no evidence of any active mischief there. The abdomen was much distended, and the umbilicus prominent. The abdominal wall was very thin, and visible peristalsis could be seen in the region of the umbilicus. The lower part of the abdomen was occupied by a very ill-defined swelling, which was markedly flaccid, and which extended outwards towards the right flank. To the left of the middle line was a well-defined rounded swelling, of solid consistence and about the size of a duck's egg, which was somewhat tender on pressure. This swelling proved to be the body of the uterus when a vaginal examination was subsequently made. There was dulness over the lower part of the abdomen, reaching up to the umbilicus and outwards towards the right flank; the left flank was resonant. On vaginal examination the cervix was rather high up, and the body of the uterus somewhat enlarged, and displaced to the left of the middle line. The posterior part of the pelvis was occupied by a swelling which was everywhere soft, and so flaccid that it was difficult to feel certain whether the fulness was caused by part of the tumour occupying the pelvis or by tympanitic distension of the bowels. The case was diagnosed as a flaccid cyst of the right ovary, probably burrowing between the layers of the right broad ligament.

Abdominal section was performed on July 11, 1907. After opening the peritoneum, the tumour presented a very curious and unusual appearance. It was at once obvious that it was not a cyst. The tumour consisted of a large, œdematous, flattened mass, covered by peritoneum, presenting a well-marked incurved edge on the upper part, not unlike the edge of the liver. The upper end extended as high as the right hypochondrium. The tumour was thinnest in the upper part and broadened out towards the pelvis, in which it was completely embedded. Posteriorly the peritoneum could be seen reflected from the tumour on to the rectum at the level of the sacral promontory, and anteriorly the peritoneum was reflected on the uterus. The body of the uterus was raised out of the pelvis and readily distinguished. The pelvic portion of the tumour had burrowed considerably under the right broad ligament, but the left broad ligament was not encroached upon. The abdominal incision was extended and the tumour brought out through the wound. The large mass of vessels running over the tumour in the right expanded broad ligament was clamped and secured with ligatures, the right ovary being left. The peritoneum was divided posteriorly at the reflection on to the rectum, and the bladder was carefully separated from the front of cervix and the anterior part of the tumour. The peritoneal covering of the left side of the tumour was also cut through, all bleeding vessels being ligatured. The enucleation of the tumour from the pelvis was now begun, and proved to be a very difficult operation, owing to the extreme friability of the mass and the vascular connections of the tumour. The tumour had to be carefully separated from the front of the rectum, which was exposed over a length of about

5 inches. On either side of the pelvis the tumour was found to completely fill the fossæ, and after enucleation a very rough uneven surface, owing to adherent tags of the tumour, was left. Anteriorly the most adherent portion of the tumour was to the posterior vaginal wall, which was much expanded. No portion of the tumour was connected with the body of the uterus or the cervix.

There was very free hæmorrhage into the cavity left after enucleation of the tumour, and two large plugs of gauze were packed in temporarily. In the meantime it was thought well to remove the uterus, as it was very likely to cause trouble in the future if left *in situ*. A large portion of the redundant posterior vaginal wall was removed with the uterus. After securing with ligatures all important bleeding points, the temporary plugs in the pelvis were removed, two fresh ones were inserted, and the ends passed through into the vagina. The peritoneum was then brought together, so as to cover up the large cavity in the pelvis entirely. The abdominal wound was then closed.

Description of parts removed:—The tumour consists of a semi-solid flattened mass, covered over its upper part with peritoneum, but very friable and ragged in the lower portion. The upper part of the tumour is about 1½ inches thick; the lower part is more elliptical in shape, with a diameter of 4 inches. The weight of the tumour is 7 lbs. 5½ ozs. Length, 18 inches; breadth, 15 inches. The posterior surface of the tumour presents a longitudinal furrow about 1 inch wide, extending over the greater part of the surface, which is covered by peritoneum. The upper end of the tumour has an incurved margin. On section the tumour is seen to be markedly œdematous.

The uterus removed is slightly enlarged. On section the uterine wall is thicker than normal; the mucous membrane of the uterus is injected.

Dr. Dudgeon kindly made an examination of the tumour, and reports it to be an œdematous fibroma. No evidence of any muscular tissue could be discovered by differential staining by van Giesen's method.

The patient had a considerable amount of shock after the operation, which was treated by the usual measures, and on the following day she was feeling fairly comfortable, with pulse rate 136. After forty-eight hours the vaginal plug was removed. There had been a moderate amount of oozing since the operation. On the fourth day after operation the patient had suddenly a very severe hæmorrhage from the vagina, which was checked by means of a hot saline douche into the cavity in the pelvis, followed by plugging. At this time the discharge was distinctly offensive, and there was evidently some sloughing of portions of tissue forming the ragged wall of the cavity in the pelvis.

On the fifth day after operation the general condition had much improved, and the pulse had steadied to 112. At 10 a.m. on the same day, however, the patient again had a very severe hæmorrhage from the vagina and became pulseless. Two large iodoform plugs were introduced into the cavity and further hæmorrhage stopped. At this time the patient began to have a hectic temperature varying between 99° and 101° and 102°, and the discharge from the cavity was extremely offensive. On the twelfth day a large slough came away with the douche, and at this date the patient was transferred to the ward for septic cases. The patient passed through a critical time during the next three weeks, suffering from septic absorption owing to the condition of the large cavity still present in the pelvis. This, however, gradually contracted up, and the discharge steadily decreased in amount, with improvement in the patient's general health. On August 28 the patient was discharged, and on vaginal examination it was found that there was only a small cavity, which admitted half the length of the forefinger, communicating with the vagina.

A letter was received from the patient a few days ago, stating that she was at that time well and gaining strength.

It is difficult to say in what structure the tumour originated. It certainly had no connection with the uterus or cervix. Its structure being that of an œdematous fibroma, it seems probable that it originated in the cellular tissue of the pelvis, possibly in the recto-vaginal septum.

Mr. ALBAN DORAN asked if the fibroid removed chiefly occupied the mesosalpinx or mesometrium, the portion of the broad ligament below the level of the ovary. In Mr. Doran's own case, published in the 41st volume of the *Transactions of the Obstetrical Society of London*, the bulky tumour lay between the folds of the mesometrium without opening up the mesosalpinx, so that the Fallopian tubes and ovaries lay free on the upper surface of the tumour. When removing a fibroid by enucleation from the mesometrium the surgeon must remember that the ureter may run above it, though as a rule it runs below the tumour, in which case it may be firmly adherent to the lower surface of the new growth.

Dr. TATE said, in reply to Mr. Alban Doran, that although the tumour had burrowed between the layers of the broad ligament it had not caused any lengthening of the Fallopian tube.

An Epidiascopic Demonstration on "The Physiological Action of the Placenta."

By W. E. Dixon, M.A., M.D., and Frank E. Taylor, M.A., M.D.

We are at present engaged in an investigation into the physiological effects which result from the intravenous injection into animals of extracts of normal human placentæ.

If fresh human placentæ are placed in absolute alcohol directly after birth, and later on minced, filtered through muslin, and then evaporated to dryness and taken up in absolute alcohol, an active solution is obtained which has certain definite physiological effects. For experimental purposes it was found convenient to evaporate this solution to dryness and then to take up the residue with normal saline solution. Experiments were made upon cats, rabbits and dogs, and the results in each case were of the same nature.

This substance causes a powerful rise in blood-pressure, which is mainly due to constriction of peripheral vessels and bears a close resemblance to that produced by adrenalin. The rhythmic contractions of the pregnant uterus are greatly increased and the tonus is raised, whilst in the non-pregnant uterus relaxation of the muscle-fibres is produced. Other plain muscle is affected (so far as we have investigated) in the same way as by adrenalin, intestinal movements, for example, being inhibited. (A series of tracings showing these results was projected on to the screen by means of the epidiascope.) The chemical substance thus obtained from the placenta appears to possess all the properties of adrenalin, but does not seem to be the latter substance, since it does not give any of its characteristic chemical reactions.

In our later experiments we have been led to believe that this substance may develop as the result of autolysis, but the whole subject is still under investigation, and we prefer to delay our full paper to a later occasion. The chemical nature of the active principle contained in placental extract is being further investigated by Dr. O. Rosenheim and Dr. Frank E. Taylor.

DISCUSSION.

The President thanked the authors for the interesting and valuable demonstration they had given, and he hoped that many more papers dealing with experimental work would be read before the Section. He asked whether the authors' results tallied with those of Acconci, who had written somewhat extensively on the subject of placental extracts. Acconci's work, "Researches on the Formation of the Plastein from Placental Extracts," published in 1906, had just come into his hands, so that he had not had time to master its contents. He thought the authors, in "suggesting a tentative hypothesis," were wisely cautious in drawing conclusions from their experiments.

Dr. Macnaughton-Jones said that watching the results of the experiments on blood-pressure, and seeing that the increase appeared to be greater than that of adrenalin, placentine would probably prove a valuable physiological agent for administration previous to anæsthetisation in serious abdominal operations, the more so now that the scopolamine, morphia, and chloroform method was frequently adopted. Since he (Dr. Macnaughton-Jones) had seen Prof. Schäfer's paper and Mr. Scharlieb's experiments conducted in Edinburgh some few years ago, he had always used strychnine and atropine for the same object. This, of course, was a collateral issue arising out of the paper.

Dr. Amand Routh alluded to his case of "Parturition during Paraplegia" (published in 1897 in the *Transactions of the Obstetrical Society of London*, vol. xxxix.), where the spinal cord had been destroyed by injury in the dorsal region five months previously. Dr. F. W. Mott and he had suggested that labour was, partly at all events, induced by the metabolism of the pregnant uterus. That case clearly proved that lactation, which was normal, could not have been induced by reflex nervous action, for the spinal cord was destroyed between the nerves going to breasts and uterus. Dr. Routh then pointed to a bio-chemical cause arising in the uterus as being the probable exciting cause, acting through the blood. Had the authors experimented in this direction by noting the effect of the injection of placental extract upon mammary gland activity? He agreed with the authors that perverted metabolism might produce an autotoxæmia, which might cause albuminuria, acute yellow atrophy of liver, insanity, and hyperemesis gravidarum.

Dr. W. S. A. Griffith said that the thanks of the Section were due to the authors for the paper, for the facts which they had brought forward were the result of laborious research. He could not, however, accept the chief conclusion which they had drawn from these facts, for there appeared no evidence whatever that a substance contained in the placenta, though ascertained to increase uterine contraction, would cause labour either premature or at full time. The question of the nature of the labour pains, as distinguished from the contractions which are known to occur throughout the actual sexual life of a woman, and are so obvious during the course of pregnancy, was too large a one to attempt to discuss on that occasion. It appeared to him that the contractions of pregnancy are comparable to the colicky pains of contraction of the bowel unrelieved, and that the essential difference in each case consists rather in relaxation of the orifice than of a new form of contraction. There are many agents which increase uterine contraction, but which are almost useless for the induction of labour.

Dr. C. Nepean Longridge asked Dr. Taylor if the induction of labour at thirty-six weeks was a long process in the case in which he found the placental extract was very active. He mentioned that he had himself found a definite and progressive rise of blood-pressure in a number of primigravidæ during the latter months of pregnancy. He also referred to the theory of Dr. Blair Bell that labour was brought about by the accumulation of calcium in the blood. But since calcium was practically insoluble in alcohol it could not be a constituent of the extracts which Dr. Taylor had used in his experiments. It cannot, however, be asserted that calcium salts have nothing to do with the matter, because there are so many examples in which vital activity depends on the interaction of organic and inorganic substances in the body.

Chorionepithelioma of the Uterus with Extensive Vaginal and Visceral Metastases.

Shown by Dr. THOMAS WATTS EDEN.

THE patient was a married woman, S. W., aged 26, who presented herself in the out-patient department of the Chelsea Hospital for Women in June, 1907, complaining of weakness and loss of flesh. She had had one child in December, 1905, which she suckled for more than twelve months, *i.e.*, until January, 1907. In the month of February, 1907, repeated severe losses of blood occurred, which were attributed to a miscarriage, but as there had been no return of menstruation since her confinement, she did not know that she was pregnant. After the month of February no further hæmorrhage of any kind occurred. Her health became rapidly unsatisfactory, and in the month of May she noticed a small swelling in the vulva which increased steadily in size up to the time of her coming to the hospital. There was no vaginal discharge, and she did not complain at all of pain. In the out-patient department she was seen by Mr. F. L. Provis, who examined her and recommended her for immediate admission with a diagnosis of probable deciduoma malignum.

She was admitted to the hospital on June 21, and I saw her two days later. She was a very thin, anæmic woman, looking very ill, with a little irregular fever varying from 99·6° to 100·6°; the pulse rate was disproportionately rapid, varying from 108 to 120. Her respirations were rapid, 32 to 36, and she said she had once or twice spit up a streak of blood. Except for the presence of loud anæmic bruits over the base of the heart, the physical signs of the chest were normal, and the examination of the urine was negative. On proceeding to examine her I found a growth of considerable size attached to the lower part of the anterior vaginal wall, which prevented a satisfactory examination of the uterus being made. I therefore decided to examine more fully under anæsthesia, and this was done on June 25. I then found a circular, flat, soft growth, about ½ inch thick, nearly black in colour, with a somewhat sloughing surface, attached to the anterior vaginal wall, the lower margin reaching to within ¾ inch of the meatus urinarius. It bled very little indeed when touched, there was a little brownish discharge and a slightly offensive odour, but its consistence was definitely friable. The vaginal mucous membrane was reflected over its edge, and on pinching up the base between the fingers it did not appear to involve deep structures. Two other smaller growths of a dark plum colour, but covered with mucous membrane, were found, one in the anterior, the other in the posterior vaginal wall, near the ostium vaginæ. In addition there was a small ragged ulcer, the size of a sixpence, with a dark shreddy base, on the posterior surface of the right labium minus. The portio vaginalis and vaginal fornices were healthy; the body of the uterus was retroverted, considerably enlarged, of softish consistence, and quite movable. The sound passed 4½ inches, and at the fundus one could detect a soft, friable mass, which was penetrated easily by the point of the sound. There was very little bleeding from these manipulations.

It was therefore clear that we had to deal with a new growth of the body of the uterus, and the vaginal growths being typical of chorionepithelioma, the diagnosis could hardly be in doubt. After a little consideration, I decided to remove the uterus at once, and to deal with the vaginal growths a week later, the patient's general condition being unfavourable for prolonged operative manipulations. I therefore took out the uterus, with the tubes, ovaries, and as much as possible of the broad ligaments, by abdominal pan-hysterectomy. A blood-count made on the day of operation showed 28,800 leucocytes with 75 per cent. of polymorphs. For about a week her general condition improved, the highest temperature recorded being 100°, while the pulse and respiration rates diminished to some extent. On July 2 I removed five vaginal growths freely, taking a clear piece of healthy mucous membrane around them; those first noted had all increased in size, and a new one had appeared. In removing the largest one the base of the bladder was exposed, but not injured. For two or three days the improvement in her condition was maintained. Then the temperature began to rise, the breathing became embarrassed, a little plum-coloured fluid was occasionally expectorated, and crepitations were detected at the base of the right lung. From this time the patient went rapidly downhill. The vaginal wounds all healed by first intention; but on July 16 a fresh growth had appeared on the right vaginal wall. On July 17 two ounces of blood-stained fluid were withdrawn from the right pleura, but on the 19th she died.

A *post-mortem* examination was made on July 19, by Dr. F. E. Taylor, Pathologist to the Hospital, whose report is as follows: "Body emaciated and pallid. A well-healed recent operation wound occupied the middle line of the lower abdomen. On opening the abdominal cavity no trace of peritonitis was found. The internal genitalia were absent, a

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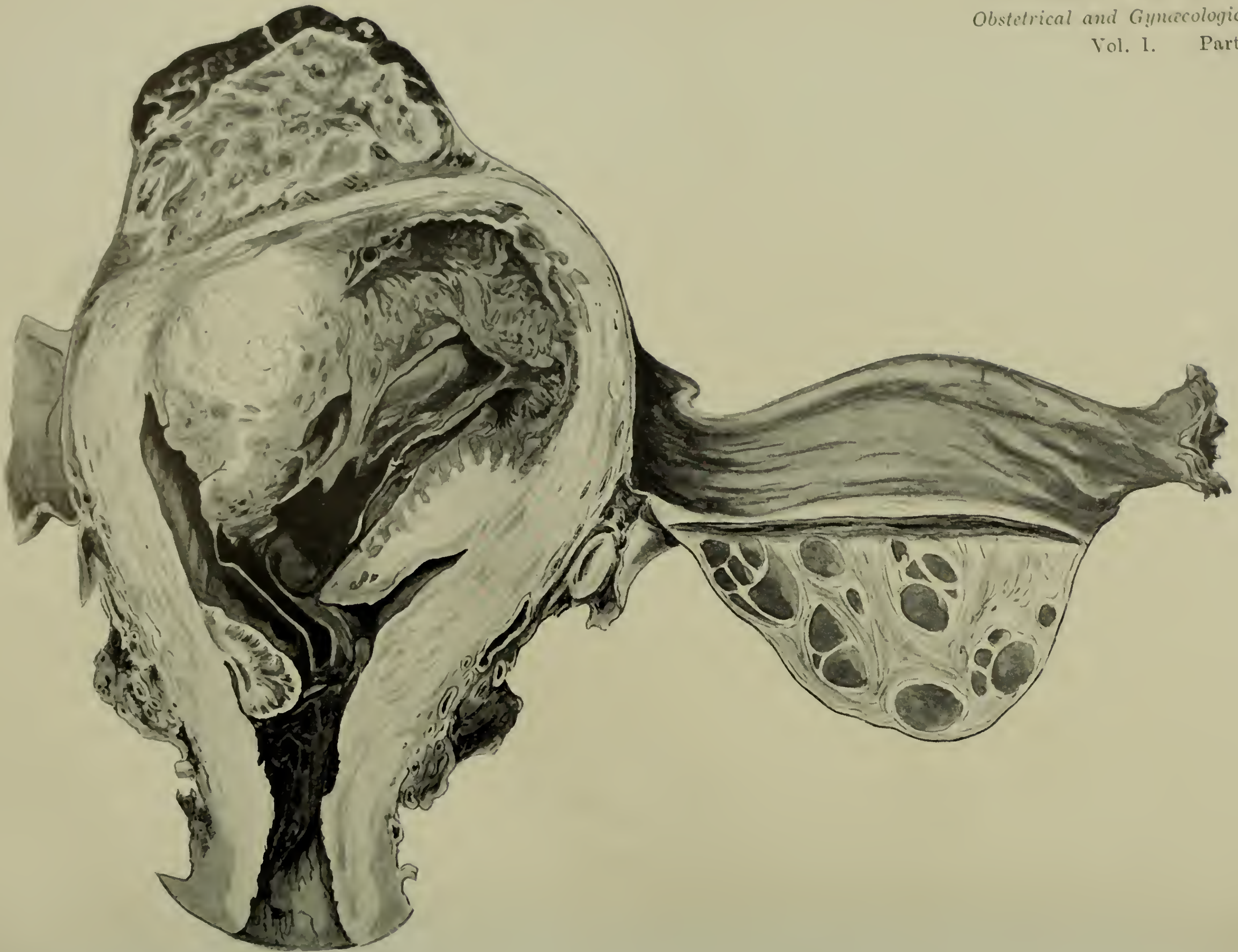

EDEN: *Chorionepithelioma of Uterus.*

well-healed scar stretching transversely across the pelvic floor. The scar and its neighbourhood were free from growth. The stomach, intestines, kidneys, bladder, pancreas and suprarenals were free from growth and normal. The liver was enlarged, and on the free border of the right lobe was a nodule of secondary growth, the size of a walnut. The pelvic and abdominal lymph glands were free from growth. The lungs were studded with masses of new growth, being almost solid. The right pleura was adherent, almost universally, to the chest wall. Heart normal. The larynx and thyroid were normal. On opening the skull, two small hæmorrhagic masses of growth were found in the brain: (1) on the surface of the quadrate lobe; (2) on the posterior part of the corpus striatum. There was also a nodule of hæmorrhagic growth beneath the mucosa of the right wall of the vagina, just within the introitus vaginæ."

The Uterus and Appendages.—As shown in the drawing, the specimen consists of the posterior half of the uterus divided in coronal section, with the tubes and ovaries attached. The uterus measures 5 inches from fundus to os externum, and 4 inches in its greatest transverse diameter. It is about the size of a ten weeks' pregnant uterus, and on external examination is symmetrically enlarged except at the fundus. At this part lies a protuberance measuring 1 inch in vertical and 2 inches in transverse diameter; in the recent state it was of a deep plum colour, soft in consistence, slightly nodular externally, and absolutely free from adhesions.

Examination of the cut surface of the uterus shows a mass of new growth situated in the upper part of the cavity. The central and lower parts are dark in colour and somewhat broken up—possibly as a result of the use of the sound. The remainder of the mass is pale like the uterine wall. The protuberance on the fundus is formed by a mass of new growth which has perforated all but the peritoneal coat. It is interesting to note the great resistance which has been offered by the peritoneum to the attack of the tumour cells, for there is a total absence even of inflammatory reaction. At the periphery of the growth invasion of the fibro-muscular tissue can be seen with the naked eye. In the lower part of the body of the uterus an isolated nodule of growth is seen, not directly connected with the mass of the tumour. The Fallopian tubes are normal. Both the ovaries are enlarged and cystic.

Histology.—Microscopic examination shows the well-known features of the disease, which need only be briefly stated. The centre of the mass consists of necrotic tissue—tumour tissue and altered blood. Around the periphery the characteristic elements are found actively invading the uterine wall. The syncytium is abundant, but is grouped in masses of somewhat small size. The Langhans cells are very numerous, and present the usual character and arrangement. There are also many large cells of variable shape, with large globular and sometimes multiple nuclei. No villi were found.

The secondary growths in the vagina, the lungs, and the liver presented identical characters; those in the brain were not examined. Sections of the ovary showed no excess of lutein tissue; but, knowing the interest he takes in this matter, I sent half of each ovary to Dr. Cuthbert Lockyer, who examined them in serial section, and reported that although there was an excess of lutein tissue, it was degenerated and showed no sign of activity.

This case must therefore be added to the list of those which are opposed to the theory of Fränkel, that chorionepithelioma is set up by the effect of excessive production of lutein cells in the ovary.

Remarks.—It is somewhat curious that this is the first case of chorionepithelioma which has come under observation at the Chelsea Hospital for Women, although many thousands of cases have been seen there since general attention was first directed to the subject. The case here recorded is fairly typical of its class, both in clinical features and histological details. The only remarkable clinical feature is the absence of hæmorrhage, except for two to three weeks, several months before she came under observation. As a rule, repeated and severe hæmorrhage is the leading symptom of the disease, its severity being due to the peculiarly destructive action of the syncytium on the walls of the blood-vessels. No explanation of the absence of bleeding in the present case can be found in the histological features of the growth, but it must be said that other cases also characterised by absence of bleeding have been recorded. As closely related to this point must also be noted the absence of the usual profuse and offensive discharge; only the large vaginal mass which protruded from the vulva showed any sign of sloughing. That the growth was highly malignant was well shown by the rapidity with which the vaginal metastases were observed to grow and multiply. The question remains, whether the radical operation was justified under the circumstances, which it must be admitted were not favourable. The patient was cachectic, the pelvic growths were extensive, and there was at the least a suspicion of the presence of pulmonary metastases (rapid breathing and slight hæmoptysis) at the time of the operation. But it is to be remembered that a certain number of cases of chorionepithelioma have been recorded in which, after removal of the uterus with the primary growth, spontaneous disappearance of vaginal metastases and of presumptive pulmonary metastases has been observed by reliable writers. Since the pelvic disease appeared to be entirely accessible to surgical treatment, it was thought proper to give the patient the only chance of life remaining to her by the radical operation.

DISCUSSION.

The PRESIDENT remarked upon the unusual appearance of the subperitoneal growth, which was separated from the intra-uterine growth by a layer of fibromuscular tissue. He asked whether an irregular invasion of the uterus by the tumour accounted for the peculiar appearance in the section.

Mr. MALCOLM wished to emphasise the point, mentioned in the paper, that in a very considerable number of cases of chorionepithelioma the evidence of a preceding pregnancy was not conclusive.

A Case of Pregnancy complicated by a large Cervical Fibroid. Subtotal Hysterectomy at the Fourth Month.

By J. BLAND-SUTTON.

A PRIMIGRAVIDA, aged 39, in the fourth month of pregnancy, was enjoying a motor tour. One evening, after a long journey, she experienced pelvic pain and discomfort, and a few hours later began to vomit, the abdomen became distended, and she was unable to void wind by the anus. The patient was attended by a local doctor, who detected a hard and tender swelling in the left side of the pelvis, and he thought it probable that the symptoms were due to an ovarian cyst which had undergone axial rotation. The intestinal difficulty and vomiting persisted for three days in spite of the use of enemata; the bowels then acted and the pain slowly subsided. At the end of a week from the onset of the symptoms the patient was conveyed to London. When I saw her the uterus reached the umbilicus, and its surface was irregular from fibroids embedded in its anterior wall and fundus. On vaginal examination a large, hard, ovoid mass could be felt, occupying the pelvis and pushing the neck of the uterus high up and to the right. There was no interference with micturition, and no pain. I had no doubt that a large cervix-fibroid was complicating the pregnancy, and careful attempts to move it out of the pelvis by pressure had no effect. The patient then informed me that she knew she had fibroids in her uterus for six years, and that she had been under the care of Dr. John Phillips. I at once communicated with him, and we saw the patient in consultation. Dr. Phillips came to the same conclusion, namely, that the pelvis was occupied by a large fibroid which could not be displaced upwards. He had seen the patient when she was six weeks pregnant; the tumour then appeared to be about the size of a tennis ball. He was greatly surprised at the increase in its size in so short a period. Dr. Phillips was certain that if miscarriage occurred the fœtus, even at the fourth month, could not be extracted through the vagina, and, with the threat of intestinal obstruction recurring, there was only one course open to us, namely, hysterectomy. Five days later I performed subtotal hysterectomy, conserving one ovary, the left. The patient made an afebrile recovery, and left the nursing-home twenty-two days after the operation.

The uterus was carefully hardened and bisected. Several fibroids are embedded in its walls, but the obstructing tumour arose apparently from the supravaginal portion of the cervix and burrowed into the left broad ligament. In the fresh state this tumour measured 15 cm. in its long, and 12 cm. in its narrow axis. The cut surface in colour resembled fresh beef-steak, due to red degeneration (aseptic necrobiosis), which I have endeavoured to have represented in the accompanying drawing.

This case affords an additional example to many I have recorded in which the occurrence of red degeneration in a fibroid complicating pregnancy gives rise to pain, which is sometimes so sudden and so acute as to lead even experienced practitioners to think that it is caused by acute axial rotation of an ovarian tumour.

DISCUSSION.

The President asked whether it would not have been possible to postpone operation until the child was viable. The patient appeared to have recovered from the acute attack. He had seen a large number of cases of pregnancy complicated by fibroids, but had only twice found it necessary to perform hysterectomy. In both these cases living children were obtained by Cæsarean section towards the end of pregnancy. He had once seen a patient, pregnant in a fibroid uterus, suffering from intestinal obstruction with stercoraceous vomiting. Copious enemata relieved the obstruction, and the patient was some months later delivered of a living child after induction of premature labour on account of albuminuria.

Dr. Arthur Giles commented on the rarity of the association of pregnancy with cervix-fibroids, saying that he had not met with such a case himself, and did not recall any in the literature of the subject. He asked Mr. Bland-Sutton whether, in his large experience, he had met with a previous instance of the complication.

Mr. Bland-Sutton, in reply, said that the question of allowing the pregnancy to continue for a few months with the hope of obtaining for the mother a viable child by Cæsarean section had been carefully considered, but Dr. John Phillips was clearly of opinion that the pelvic conditions were such as to render this course too dangerous for the mother, and he regarded unnecessary delay as undesirable. Concerning the question of cervix-fibroids and pregnancy, Mr. Bland-Sutton said that the presence of a large fibroid in the cervix was a great obstacle to conception, but by no means prevented it; of all forms of fibroids none formed so serious a bar to successful pregnancy as a large tumour in the neck of the uterus.

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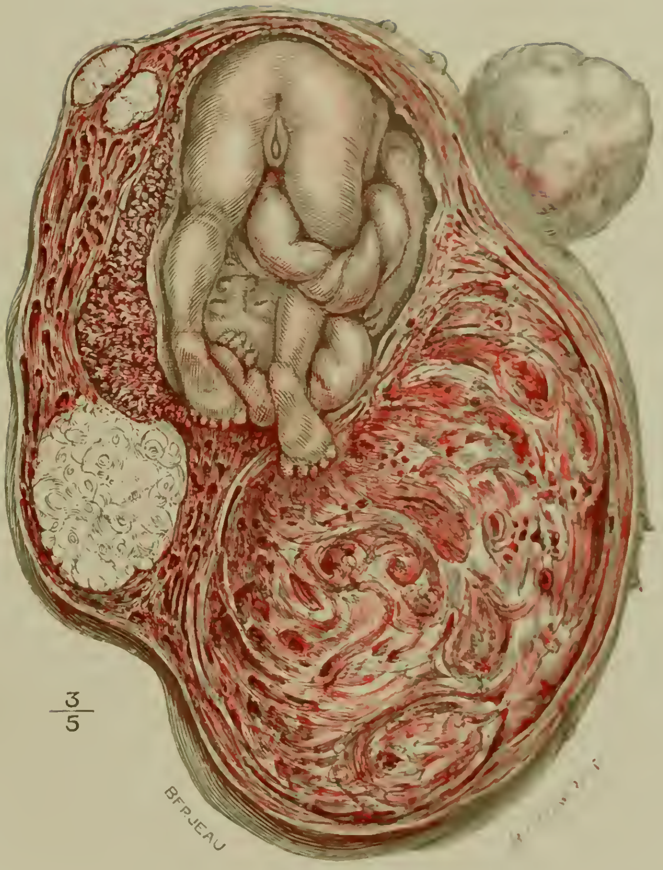

A pregnant uterus complicated with fibroids. Subtotal hysterectomy at the fourth month. The large cervical fibroid was in the condition known as red degeneration: the tumour when fresh measured 12 cm. in its minor and 15 cm in its major axis.

BLAND-SUTTON: Large Cervical Fibroid complicating Pregnancy.

Obstetrical and Gynæcological Section.

November 14, 1907.

Dr. Herbert Spencer, President of the Section, in the Chair.

Pubiotomy, with Notes of an Illustrative Case.

By Thomas Wilson, M.D.

In the intermediate degrees of pelvic contraction, when the conjugate diameter measures between 2¾ inches and 3½ inches, efforts have continually been made, at least since the middle of the eighteenth century, to devise a method of securing a living child without at the same time increasing the risks of the mother. These efforts have taken two directions: to enlarge the bony circle of the pelvis on the one hand, and on the other to procure a smaller child. When the patient is seen early in pregnancy, the latter object is sought to be attained by the induction of premature labour, which was first introduced as an obstetrical procedure in this country, where it was performed successfully by Macauley in 1756, and has ever since been regarded with peculiar favour. The results of induction of labour in cases of contracted pelvis have been gratifying so far as the mother is concerned. Sarwey (Winckel's "Handbuch der Gebürtshülfe," Bd. iii., Tl. 1), in a collection of 2,200 cases in the fifteen years from 1890 to 1904, found a maternity mortality of 32, equal to 1·4 per cent., 13 of the women having died of puerperal infection. As regards the child the results, as might be expected, are much less satisfactory. In the same series of cases Sarwey found that 21·8 per cent. of the children were born dead and another 15·5 per cent. died before the mothers were discharged from hospital, so that only 1,380 children, equal to 62·7 per cent. of the whole, were discharged living. The risks of the first year of life are greater in premature infants than in those born at full term, and on this point Sarwey enquired into the fate of 500 children in his collection who were discharged living from 12 different institutions; of these 406 (= 81·2 per cent.) were alive at the end of the first year. I have quoted these figures because they are the most favourable large statistics of the results of induction of premature labour that I have been able to find. It follows from them that not more than 50 per cent. of the children obtained by this operation are alive at the end of the first year, a result that calls for grave consideration, more especially at a time when the birth-rate in these islands shows a continuous and somewhat rapid diminution.

In cases where premature labour is indicated, and where craniotomy has often to be performed, a safe and not too difficult method of widening the bony pelvis has long been sought. For this purpose division of the pubic symphysis was first recommended in France in 1768 by Sigault, who put the operation to a practical test in 1777. His patient had a rickety pelvis with a true conjugate diameter of 6·5 cm., and had previously borne four dead children. Two months after the operation the patient walked with considerable difficulty, and had a urinary fistula which never healed. In the following two years 8 cases were made known, with the deaths of 4 of the mothers and 7 of the children. After such experiences symphysiotomy fell into disrepute until the latter part of last century, when it began to be recommended again by Morisani, in Naples, in 1866, and Pinard, in Paris, in 1892.

In the five years 1887 to 1892, Morisani operated on 55 cases, with 2 deaths of mothers (= 3·6 per cent.,) and 4 deaths of children (= 7·3 per cent.). Pinard, in 1892 to 1894, performed 49 symphysiotomies with 2 deaths of mothers and 5 of infants. Zweifel, until 1899, had done the operation 35 times without a maternal death; then, in 11 weeks, he lost 3 mothers; his total maternal mortality was thus 6·5 per cent., while 4 of the children (= 8·7 per cent.) died.

In this country symphysiotomy has never been regarded with general favour, and the only paper on the subject of any practical importance is one by Herman in the *Obstetrical Transactions* for 1901, vol. xlii., p. 282, in which the author describes the subcutaneous method of performing the operation. A sharp tenotomy knife, having a blade an inch long and one-eighth of an inch in diameter, is inserted opposite the middle of the symphysis pubis, and the joint is divided by cutting first down, then up. The advantages claimed for this method are simplicity, quickness, small risk of sepsis, insignificant hæmorrhage, absence of a gaping wound and of subsequent scar. The only risk at present inseparable from the operation is considered to be that of injury to the urethra, which is likely to happen in excessive separation of the pubic bones in cases in which an attempt is made to deliver by symphysiotomy too large a child. In Herman's paper 3 cases are described, and 4 others referred to, as having been performed with good results in the London Hospital.

The apparent simplicity of the operation is attractive, but on attentive consideration it appears that in the immediate neighbourhood of the part chosen for division are many structures which it is very desirable to avoid. The clitoris and its corpora cavernosa can hardly escape injury, and may be the sources of severe hæmorrhage difficult to control. Behind the symphysis is a large and important plexus of veins, while the bladder and urethra are in imminent danger of being crushed during the delivery of the child or torn by the separation of the bones. In practice the operation has by no means proved to be an easy one, and its difficulties and dangers have resulted in its being rarely practised in this country.

In the last few years an attempt has been made, more particularly in Italy and Germany, to establish another operation for widening the bony pelvis by dividing the pubic bone instead of the symphysis. This procedure appears first to have been recommended by Champion de Bar-le-Duc and Stoltz at the beginning of the nineteenth century. According to Zweifel (*Zentralb. für Gynäk.*, 1906, p. 1), Galbiati operated, in 1832, by sawing through the pubic bone on one side, and, in 1841, by sawing through the pubes on both sides, but the results do not appear to have justified an extensive use of the operation. In 1893 Gigli recommended that the pubes should be divided by means of his saw, which resembles a length of piano wire, but the operation was not actually employed on the living subject until five years later, when in 1898 Bonardi employed it for the delivery of a quartipara with a simple flat pelvis who had already had several difficult labours. Bonardi was soon followed by Calderini, of Bologna, and Van de Velde, in Haarlem, and then the operation rapidly became popular in Germany, where it has been specially practised by Döderlein, Leopold, Fritsch, Baumm, and Olshausen. In the last four years considerably more than 200 cases have been reported, and almost an equal number of papers and references have appeared, especially in the *Zentralblatt für Gynäkologie.*

In this country Berry Hart (*Edin. Obst. Trans.*, 1903-04, vol. xxix.) was the first to try the operation, which has received the various names of pubotomy or pubiotomy, lateral section of the pelvis (Gigli), hebotomy (Van de Velde), and pubosteotomy. In Hart's case the operation was quite successful in effecting delivery, but the patient died of late chloroform poisoning. The case on which the present communication is founded was the second to be performed here. In the May number of the *Journal of Obstetrics for the British Empire* for this year papers appeared by Gibson and Hastings Tweedy, each of whom has performed the operation with success three times. In Tweedy's first case there were great difficulties and alarming complications, but the conjugate diameter measured only slightly more than 2½ inches. The total number of pubiotomies so far done in these islands appears to be eight, all the children being born alive, and one mother dying from the results of anæsthesia.

Two methods of performing the operation have been devised—the open and the subcutaneous. In the former a free incision is made down to the pubic bone, which is then divided by the wire saw. This method has many disadvantages, among which the dangers of excessive hæmorrhage and of wound infection are the chief. These dangers are avoided by the subcutaneous method, which is named after Döderlein, and is now almost universally preferred. In this method the patient is placed upon the back with the knees bent and the thighs abducted and slightly flexed. A small vertical incision ¾ inch in length is made straight down upon the pubic spine; a large specially constructed curved needle is then carried down behind the pubes, care being taken to keep the point of the needle in close contact with the surface of the bone. The point is made to emerge at the outer side of the labium majus, the wire saw is attached and the needle withdrawn. The bone is then divided in a line nearly parallel to, and at a distance of ½ inch from, the symphysis. As the bone is divided there is some bleeding, usually moderate in amount, but occasionally profuse; in the latter case pressure for a short time suffices to stop the loss. The child is then delivered by the method that appears the best, the position of the legs being varied according to circumstances. Afterwards the upper wound is closed by one or two sutures and the lower wound is also closed, or in some cases drained by a narrow strip of iodoform gauze. The pelvis is supported by a sandbag on either side, or by a broad strip of strapping across the front, or by an elastic bandage. The patient in most cases can get up without pain or discomfort on the sixteenth or eighteenth day.

This short description of the operation requires to be amplified in several important practical directions. *The side chosen for the incision* in vertex presentations is usually that on which the occiput lies, unless there is some contra-indication, such as varicose veins or hernia on that side. If the bladder is clearly on one side the incision should be made on the other. Van Cauwenberghe claims that his observations on the cadaver show that widening is greater on the divided side, and in unequally contracted pelves he recommends, therefore, that the cut should be made on the smaller side. The *method of passing the needle* varies with different operators. Usually this is done from above down, but Walcher and other operators pass the needle from below up, a method recommended by Tandler as the result of his anatomical researches. The main source of bleeding in pubiotomy is injury to the crus of the corpus cavernosum on the side of the division, and by cutting down on the lower border of the pubic ramus, separating the periosteum and with it the crus from the bone, and then passing the needle from below up, it is thought that injury to the crus may be avoided. Even then, however, there is a risk of the crus being injured by the movements of the saw in dividing the bone, and as the bleeding is usually moderate and easily controlled by pressure, the slight additional complication appears to be unnecessary.

In the *method of delivery* the greatest variation has appeared. That which has been chiefly employed is extraction by forceps, though many operators have preferred version. Recently there has been an increasing tendency, after dividing the bone, to leave the labour to the natural efforts. This was first recommended by Zweifel and tried by Döderlein, and it is claimed that it offers less danger to the maternal soft parts, and at the same time gives a better chance to the child. On the other hand, it has been suggested that it increases the liability to the formation of a hæmatoma. The *position of the patient's legs* at the different stages of the operation requires careful attention, and will be considered in connection with the description of the changes produced in the pelvic cavity by the operation.

The dangers of the operation include in the first place bleeding, which has rarely been so copious as to call for opening of the wound and the application of ligatures; generally the hæmorrhage is moderate in amount, and easily controlled by pressure. A slight degree of hæmaturia has been observed in a considerable proportion of cases, and appears usually to be caused by bruising of the wall of the bladder against the cut edges of the bone. In one case reported by Baumm the bladder was ruptured; in no case have I seen mention of injury to the urethra. Commonly in the hours after delivery a hæmatoma forms at the site of operation, but usually this remains small and, without giving rise to trouble, becomes absorbed in the course of a week or ten days. Œdema of the vulva is usually present in the first two or three days.

Œdema of the leg from thrombosis of veins has been several times described, sometimes on the same side as the division, and sometimes on the opposite. The risk of infection in cases that are placed under satisfactory conditions from the commencement of labour appears to be slight, and where the operation has been performed in cases of pre-existing infection the results have been on the whole satisfactory, as shown in cases reported by Schauta, Sitzenfrey, Arndt and others. It has been suggested by von Franqué that the operation can be done by hands which do not touch the genitals, and so can be carried out with reasonable safety in patients already infected. The principal danger arising out of the operation is that of laceration of the vagina, by which the subcutaneous division of the bone is converted into a dangerous compound fracture. This accident appears to be fairly common, especially in patients with narrow vagina and small vulva, and in such cases it appears better to make a deep perineo-vaginal incision on the side diagonally opposite to the division of the pubic bone. In every case the vagina should be carefully examined after delivery is completed, and if there is any laceration this should be treated by careful suturing, with provision for drainage. By these means it is possible either to prevent laceration taking place or to secure favourable union.

The results of the operation as regards both mother and infant have been excellent. The patient is able to get up on the fourteenth to the eighteenth day, and in a large proportion of cases to be sent home on the twentieth day. There is no difficulty or pain in walking. Union of the bones takes place first by the formation of fibrous, and later of osseous tissue. A considerable amount of callus is thrown out on the anterior surface of the bone, but it appears to be the rule, and certainly occurred in my case, that only an extremely small quantity is thrown out on the inner surface of the bone, an important observation from the point of view of subsequent labours. In cases where pregnancy supervenes soon after the operation, it has appeared in several cases that bony union is delayed for many months, and it has been claimed, though without sufficient evidence, by some observers that a permanent widening of the bony pelvis takes place.

The following are the notes of my case: R. J., aged 30, was admitted to the Birmingham General Hospital on October 23, 1905, for the eighth labour, which was estimated to be due on the 29th. The first four labours were terminated by forceps, all the children being born alive, the first and third still surviving; the fourth labour was attended by Mr. N. H. Turner, who recommended that the next should be induced at the eighth month.

I had first seen the patient in her fifth labour at term on September 28, 1901. The labour was obstructed; on my arrival the vulva and anterior lip of the cervix were œdematous, the child was presenting in the left occipito-anterior position, the head more in the right side of the pelvis. By forceps an average-sized male child was delivered with an extremely moulded head, a deep groove on the left parietal bone parallel to the coronal suture, caused by the sacral promontory, and facial paralysis due to pressure of the end of one blade of the forceps. The facial paralysis disappeared in a fortnight and the child lived for 3¾ years. The pelvis was reniform, the sacral promontory forming a considerable projection into the brim. The external pelvic measurements were:—

Dist. sp. il.	25 cm.
Dist. cr. il.	27·5 cm.
Ext. conj.	18·75 cm.
Diag. conj.	11·5 cm.

The patient said she had been delicate as a child, was late in learning to walk, and had to work hard from her early girlhood.

The sixth labour was induced three weeks before term by hot injections and bougie on December 17, 1902. Fifty hours after the introduction of the bougie a well-developed male child was delivered under chloroform by bi-polar version with forceps to the after-coming head. The child was with difficulty revived, and died the same evening. The seventh labour was induced at 7¾ months on September 3, 1904. Forty-five hours after the introduction of a bougie a female child, 4¼ lb. in weight and 17½ inches long, was easily delivered by forceps. It died the next day.

On the present admission the patient was said to have last menstruated on January 25. Labour pains began on the evening of November 21, 1905, and at 3 p.m. on the 22nd the cervix was fully dilatable. The child lay with its back to the right, the head freely movable above the brim; the fœtal heart, 150 to the minute, was heard far back on the right side. About three pints of liquor amnii escaped when the membranes were ruptured. In spite of strong pains, the head, which entered in the third vertex presentation, failed to engage firmly.

Operation.—The patient was anæsthetised, and forceps applied; forcible traction was then made at intervals of three minutes, but entirely failed to bring the head through the brim. Pubiotomy was determined upon, and was carried out by the modified subcutaneous method. A vertical incision 1½ inches in length was made upwards from the pubic spine on the left side. The incision was carried down to the bone, and a Gigli's saw was then, by means of a Seeligmann's director, passed downwards close to the posterior surface of the left pubic bone, and brought out at a point on the outer side of the left labium majus. The bone was easily sawn through, and the divided ends immediately sprang apart, leaving a gap of ¾ inch or thereabouts. The upper end of the division was a little internal to the pubic spine. The forceps were again applied and the child very easily delivered, the occiput coming forward into the second vertex presentation at the outlet. Ergot was now administered subcutaneously; the placenta was expressed from the vagina after fifteen minutes. The upper incision was closed by silk-worm-gut sutures; the lower small one had ragged edges from the action of the saw; it was partly closed by one suture and drained by a small strip of iodoform gauze. A broad strip of adhesive plaster was brought across the front of the pelvis from side to side. The child weighed 8 lb., and soon began to cry vigorously.

Result.—The subsequent course of the puerperium was normal in every respect. There was moderate œdema of the left labium majus, which gradually disappeared in seven days. The upper wound united by first intention, and the lower one was firmly healed by the end of the second week. On the twelfth day after operation a thick callus was felt along the line of division on the outer aspect of the bone; on the inside the division felt like a slight depression, and there was no exudation making prominence above the surface.

At the end of the third week the patient was allowed to sit up, which she did quite comfortably. Two days later she was radiographed, a clear line about ¼ inch in width showing between the divided portions of bone. During my absence from hospital for a few days my Resident interpreted this clear line to mean that no union had taken place; he therefore ordered the patient back to bed. As a consequence, when I next saw the woman she had developed a well-marked neuromimetic paralysis of the left leg. Every movement of the limb, including abduction, adduction, and rotation of the thigh, could be performed perfectly by the woman as she lay in bed; but when asked to stand she collapsed, and would have fallen to the right, the left leg at the same time becoming extended and rigid. There was no affection of sensation, the limb remained normal in nutrition and appearance, and there were no alterations in the deep or superficial reflexes. Electricity, massage, and the exercise of patience were followed in a few weeks by the return of normal power in the limb. The patient has had no further pregnancy, but has remained well and able comfortably to carry on all her household work. The child died at the age of 1½ years from some wasting disease.

The operation is in my opinion a good one, and appears to possess all the advantages claimed for symphysiotomy, while avoiding some of its more serious disadvantages. The wounds are small and placed well away from the vaginal orifice; the divided bone readily unites first by fibrous and later by osseous tissue. The situation of the division on one side of the middle line greatly lessens the risk of injury to important structures. The only likely source of hæmorrhage is the crus of the corpus cavernosum, which is usually divided at the same time as the bone is sawn through; pressure for a short time suffices to stop the bleeding. The relations of the wound in the bone to the clitoris, the bladder, and more particularly to the urethra are much less close than in symphysiotomy, and thus the principal dangers of the latter operation are avoided.

With the same degree of separation of the bones, the amount of widening of the pelvis, according to comparative observations made on the cadaver by Sellheim, is the same after pubiotomy as after symphysiotomy, but after the former operation the separation requires three times greater force. The divided ends of the bone are held in contact by the attachments of the adductor muscles, and only separate to an extent sufficient to allow the passage of the child. The sudden springing apart, which has occasionally been attended by serious injuries to the soft parts in symphysiotomy, is not likely to occur here.

The limit of safe separation of the divided bones appears to be about 6 cm., any further widening being likely to cause rupture of the sacro-iliac joints. Morisani said that after symphysiotomy with a separation of 6 cm. the conjugate diameter is increased by 13 to 15 mm., and bulging of the soft parts increases the enlargement to about 22 mm. Döderlein points out that in this amount of separation the superficial area of the brim is increased by about half, from 105 to 155 square cm. As the bones become separated the inclination of the pelvis is increased (Ahlfeld), while the cavity becomes funnel-shaped, and at the same time shallower from above down, the last effect depending upon the raising and flattening of the pelvic floor by the unyielding sacro-sciatic ligaments.

Kroemer draws attention to the effect upon the separation of the bones produced by alteration in the position of the legs. When these are bent at the knees, and the extended thighs are abducted and externally rotated as far as possible, separation of the bones takes place to the extent of barely 3 cm., the pelvic outlet being at the same time narrowed. The separation immediately disappears when the thighs are flexed on the abdomen. The alteration in the position of the thighs is of great practical importance during delivery; during the passage of the head through the brim they should be extended, to be raised again to facilitate the passage through the outlet. During labour in a breech presentation the thighs should not be dropped until the head is entering the brim. In a case related by this author the left sacro-iliac joint appeared to have been torn; a radiogram showed that the left iliac bone was drawn downwards by the adductors, the symphysis being at the same time drawn upwards.

Permanent widening of the pelvis has been asserted by Pinard to occur after symphysiotomy, and some colour has been lent to this statement by the considerable number of cases in which after this operation natural delivery has taken place in subsequent pregnancies at full term. Zweifel states that in his cases of symphysiotomy later deliveries have usually been spontaneous, and only in one or two patients has the operation been repeated. Van de Velde and others put in a similar claim that pubiotomy is followed by a permanent widening of the pelvis, but in the case of neither operation has it been proved that such a sequel takes place.

Experience must show which is the better operation, symphysiotomy or pubiotomy. The indications are the same in either case: the pelvis must not be ankylosed, and must have a conjugate diameter of not less than 2¾ inches in a flat, and not less than 3 inches in a generally contracted pelvis; below these limits Cæsarean section is the safer and better operation. If there is a probability that the patient is already infected, craniotomy will usually be preferable. Auscultation must afford proof that the child is living and strong. Labour must have advanced so far that the cervix is fully dilated, or fully dilatable, or dilatation must be completed by the hydrostatic bag; sufficient time should be allowed for the natural efforts to mould the head. If, in spite of strong pains, no progress is made in two hours in a multipara, or in four hours in a first labour, or if the maternal pulse rises so that it remains at 100 in the intervals between the pains, delivery should be attempted by the high forceps operation under chloroform. The attempts should not be prolonged or repeated, and if they fail operation should be undertaken without delay.

DISCUSSION.

The President (Dr. Herbert Spencer) said he had had no personal experience of pubiotomy or of symphysiotomy, preferring the alternative operations of induction of labour and Cæsarean section. The operation of pubiotomy had been rarely performed in Britain; but Dr. Wilson had omitted two cases operated on by Dr. Wallace, whose opinion of the operation was "not an entirely favourable one." The President thought that Dr. Wilson had not sufficiently emphasised the dangers of the operation. Baumm's two cases terminated fatally, and Robert Mann had published a case of hernia through the gap in the bone. Injuries of the bladder and vagina and thrombosis were not uncommon accompaniments of the operation, and, if not fatal, involved considerable risk. He did not think a rest of sixteen days in bed was sufficient for the proper consolidation of the bone. Dr. Wilson's case occurred in a patient with a pelvis of almost normal size, and, though he did not question the justifiability of the operation in this case, the special danger of laceration of the vagina would be much greater when the pelvis was considerably contracted. Operators seemed to be divided in opinion upon the question of immediate or deferred delivery; but he thought it would be unjustifiable to submit a patient to the pains of labour after the bone had been divided unless she were kept continuously under an anæsthetic, which itself involved risk. Although the mortality of pubiotomy was not high, it was probably at least as high as induction of labour and Cæsarean section, and involved dangers which appeared to be unavoidable and disabilities to the mother which were not met with in the alternative operations. With regard to Pinard's views on the treatment of contracted pelvis he would say something on another occasion. Meanwhile his recollection was that Pinard had with symphysiotomy lost 12 per cent. of mothers and children. Pinard's latest statistics, mentioned by Dr. Hubert Roberts, showed a maternal mortality in symphysiotomy of over 11 per cent. and an infantile mortality of 14 per cent. They also showed a growing faith in conservative Cæsarean section and a lessening faith in symphysiotomy.

Dr. Macnaughton-Jones said that, like the President, he had never had recourse to symphysiotomy. At Heidelberg, Professor von Rosthorn had given him the details of a case in which uncontrollable and fatal hæmorrhage had occurred after pubiotomy. When he was in Freiburg in 1906, Professor von Krönig had performed 30 cases without a death, and had lost two children. On the other hand, Franqué, up to March, 1905, had operated 43 times with 12 deaths and the loss of 3 children. Schauta, in his recent work, seemed to favour pubiotomy. The higher the head, Krönig had pointed out, the greater the danger to the bladder. The advantages over symphysiotomy seemed mainly to be the avoidance of hæmorrhage and of injury to the structures in the median line, as the clitoris and urethra, but Zweifel and others considered that the permanent effect, as far as pelvic uniformity and general gain of increase in diameter are concerned, was better in symphysiotomy than in pubiotomy.

Dr. GRIFFITH referred to the great difficulty in discussing and comparing records of the operations of pubiotomy and symphysiotomy owing to the different views held by different operators as to the conditions which justified the operations. His own experience was confined to symphysiotomy, and he was of opinion that pubiotomy presented no real advantages, while symphysiotomy was simple and required no special instruments. The difficulties, in his opinion, were not in the operation but in the proper choice of cases for which it was suitable. Those operators who, like the late Dr. Varnier, declined to use the forceps, premature induction of labour, or any other means than symphysiotomy for every case of even slight difficulty, naturally obtained a large number of very good results both as regards mothers and infants, but this was a line of practice that did not appeal to English obstetricians. Dr. Griffith hoped the time would come when it would be generally recognised that the treatment necessary in cases of obstruction at the brim was not to be determined by the length of the conjugate unless in extreme degrees of contraction. In these cases Cæsarean section was the only method, but in all the common, slight, and moderate degrees of contraction the length of the conjugate, while a very important factor, was *never* the determining factor. It was no uncommon experience to see a woman spontaneously delivered with a conjugate of about 3¼ inches without danger to herself or her baby, while in other cases with a conjugate half an inch longer the difficulty and danger might be great, this depending first on the size of the child's head, a favourable position of the head in relation to the obstruction, the moldability of the head and the power of the uterus; and it was in the correct judgment of these difficulties that the obstetrician of experience would be able to differentiate and select those few cases to which, in his opinion, the operation should be confined.

Dr. C. HUBERT ROBERTS wished to add his testimony to that of Dr. Griffith with regard to the importance of endeavouring to estimate *the size of the fœtal head* in contracted pelves, and not merely depending on the actual bony measurements of the pelvis itself. As to pubiotomy and symphysiotomy, Dr. Roberts thought that possibly these operations had sprung into favour abroad largely on account of a falling birth-rate. The latest statistics of Pinard in the *Annales de Gynécologie et d'Obstétrique* for September, 1907, showed this very forcibly, and in France, at all events, it would seem that the induction of abortion and premature labour in contracted pelves had been given up. Hence the frequent performance abroad of such operations as pubiotomy and symphysiotomy, especially the latter. Dr. Roberts had performed subcutaneous symphysiotomy once, at Queen Charlotte's Hospital, with good results to mother and child. He had no experience of pubiotomy.

Dr. BLACKER had hoped to hear that some of the Fellows of the Society besides Dr. Wilson had performed this operation. He had himself only practised it on the cadaver; in these circumstances it was very easy to do, especially the really subcutaneous method as practised and recommended by Baumm and others. He showed Stoeckel's needle which he had had made and which he had used on the cadaver. In the case of a patient recently under his care in University College Hospital who had four previous pregnancies, the first being successfully completed by high forceps, the child being still alive, the second necessitating craniotomy, and in the last two induction of premature labour having been performed, both children dying soon after birth, he had decided to practise subcutaneous pubiotomy, but the child was delivered alive with some difficulty by axis traction forceps applied to the head above the brim. This was a good illustration of the well-known fact that cases of contracted pelvis varied very much in the results of the labours in the same patient in different pregnancies. He was surprised to find that Dr. Wilson had not described the subcutaneous method of Baumm, which appeared to him to be much the best. The death-rate of the operation of pubiotomy, when large numbers of cases were considered, could hardly be estimated at less than 10 per cent. He thought, however, that the operation was one which promised to give good results, and he intended to perform it when he met with a case which he thought a suitable one in which to carry out this method of delivery.

Dr. THOMAS WILSON, in reply, thanked the President for referring him to Wallace's two additional cases, which brought the total number of pubiotomies performed in this country to ten. Where after dividing the bone the labour is left to the natural efforts, it does not appear to be necessary to keep the patient anæsthetised. The pain following operation in Dr. Wilson's cases was moderate, and this appears to be the rule. Time must show whether symphysiotomy or pubiotomy is the better operation. The latter appears to possess over the former the advantages of being less liable to cause severe bleeding, of endangering the bladder to a less, and the urethra to a much less, degree. It is remarkable that no discussion on pubiotomy has previously taken place in London, and that no one in this city appears to have put the operation to a practical test.

Cancer of Cervix in a woman, aged 26, treated by High Amputation with the Cautery.

Shown by HERBERT SPENCER, M.D.

M. H., aged 26, having been born on July 14, 1874 (as shown by her birth certificate in my possession), was admitted to University College Hospital on October 12, 1900, complaining of too frequent menstruation and a yellowish discharge, sometimes tinged with blood. She had been an in-patient at the hospital for eight weeks in 1896, suffering from pelvic peritonitis. Her mother died of cancer of the gall-bladder. Menstruation began at the age of 16, was quite regular in time and amount, and unaccompanied by pain till 1896. She had been married for two and a half years, but had had no child nor miscarriage.

The uterus was found to be retroverted, and not quite freely movable. The cervix was enlarged in area, and on it was a slightly raised red papillary growth, not much larger than a pea. It had the appearance of an early carcinoma and bled readily on examination. A small piece of the growth was removed for microscopic section, but it is probable that a mistake was made and that a piece of tissue removed from another patient was cut instead. The section showed fibro-muscular tissue infiltrated with leucocytes and glands lined with columnar epithelium, which nowhere showed any tendency to proliferation. It was thought to be possible that the case was one of chancre of the cervix, although there was at no time any skin-rash or other sign of syphilis. At this time the patient was found to have keratitis punctata and cyclitis, which Mr. Flemming thought to be of rheumatic origin. On October 25 I freely burnt the growth with the Paquelin cautery, and the patient left the hospital on November 6, 1900, and was instructed to come to the hospital every week for observation. In the succeeding weeks the ulcer produced by the cautery almost healed, but on January 10, 1901, a papillary growth was found in the position of the former one. The patient was readmitted to the hospital on February 26, 1901, with menorrhagia and foul discharge, and the growth had increased to the size of a shilling. It had the typical appearance of epithelioma (see plate) and bled readily on examination. A small piece excised showed the growth to be a squamous carcinoma. On March 5, 1901, the cervix and lower part of the body were removed by high amputation with the Paquelin cautery. The peritoneum was not opened. The tissues were very vascular, and Spencer-Wells forceps were left on the uterine arteries for three days. The patient recovered well, the temperature only once reaching 100° F. She has remained well since. She has lost very little at the periods since the operation, but has suffered slightly from dysmenorrhœa, especially when the flow has been scanty; when the flow has been freer she has not suffered at all. The pain has been easily annulled by 5 grains of phenacetin or antipyrin, sometimes repeated. The patient has been seen by me every few months since the operation. She is in excellent health, and, except for the dysmenorrhœa, has been so all along. The dysmenorrhœa is so easily controlled that it has caused her very little trouble. She has gained nearly 2 st. in weight since the operation.

Her first husband having died, she was married again in October, 1904. There is no pain or difficulty in sexual connection.

She was last examined by me on October 3, 1907, when she was quite well, the vaginal scar sound, the remains of the uterus freely movable, with no tenderness and no signs of recurrence. As she has remained free from recurrence for over six and a half years it may be hoped that she is cured.

A section of the cervix, exhibited under the microscope (see plate), shows the typical structure of squamous carcinoma, with the formation of "nests." A few of the cervical glands remain near the external os and show no marked change except a few papillary ingrowths covered with the usual columnar epithelium; the squamous carcinoma invades the tissue between the glands, which is infiltrated with numerous small round-cells. The carcinoma is nearly $\frac{1}{2}$ inch in thickness. The cautery has divided the vaginal mucosa at little more than $\frac{1}{8}$ inch from the growth.

Carcinoma of the cervix at the age of 26 is rare. Of Cullen's 65 cases the youngest was 31. My experience has been unusual in that, of the first 25 cases I operated on at University College Hospital, two occurred at the age of 26 and two at the age of 27. It is also rare to meet with the disease in the nulliparous, though I have seen it in a virgin. The mistake in diagnosis due to microscopic examination is a warning to keep cases under observation if the clinical appearances conflict with the microscopic.

High amputation of the cervix, especially with the cautery, gives excellent results in early cases of carcinoma of the portio vaginalis. The three cases of cancer complicating labour brought before the Obstetrical Society in 1904,[1] which were treated by high amputation, remain well after eleven years. The operation has had no mortality in my hands. It preserves the body of the uterus and its functions, including that of gestation, does not interfere with the peritoneum, and permits coïtus without pain or difficulty. In all these respects it is superior to the operation of Wertheim, which is a much more dangerous procedure; and although the latter operation is excellent for advanced cases of squamous carcinoma and for many cases of glandular carcinoma, I do not think it ought to displace high amputation or vaginal hysterectomy with the cautery in an early case of squamous carcinoma of the portio vaginalis.

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[1] *Trans. Obst. Soc. Lond.*, 1904, xlvi., p. 355.

EXPLANATION OF PLATE.

Illustrating the communication upon a case of Cancer of Cervix.

By Dr. Herbert Spencer.

Fig. 1.—Cervix after removal; natural size.

Fig. 2.—Section through cervix; natural size. *a* Cancer; *b* Vaginal mucous membrane of right fornix; *c* Mucous membrane of left side of portio.

Fig. 3.—Section through right side of cervix (low power). Above and to right is a strip of unaltered mucous membrane of the vaginal fornix. Below and to the left are seen a few glands of the lower cervical canal. The tissue of the cervix is permeated with masses of squamous carcinoma. The part of the growth near the vaginal mucous membrane stains badly, and the central cells have fallen out in places. This may be due to the heat of the cautery.

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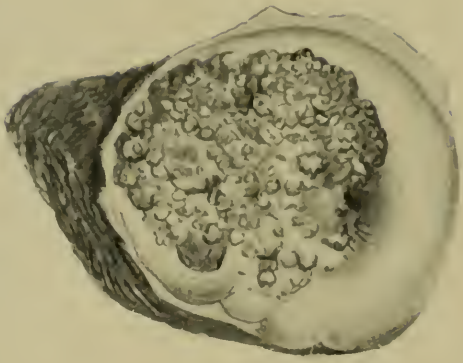

FIG. 1.

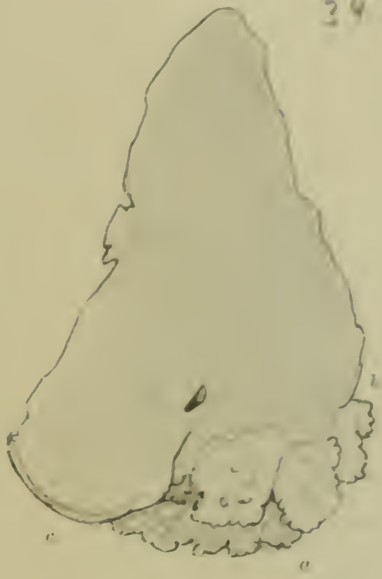

FIG. 2.

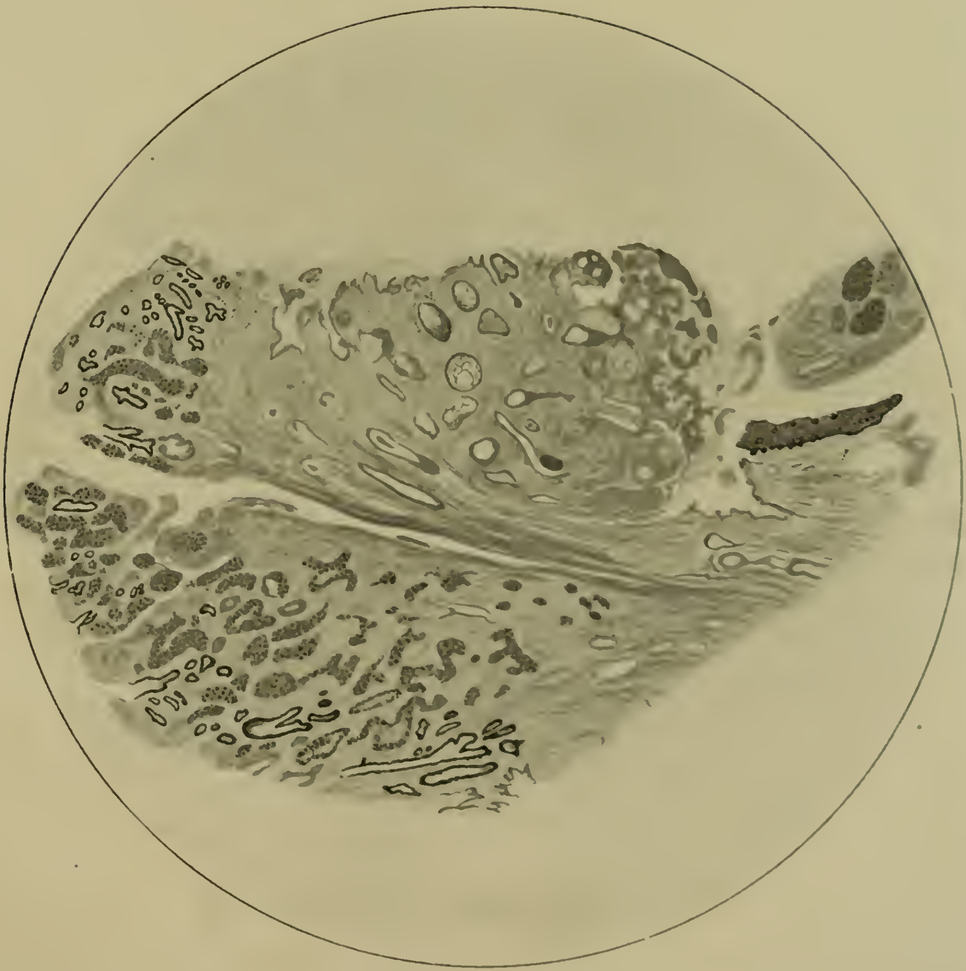

FIG. 3.

HERBERT SPENCER: Cancer of Cervix.

DISCUSSION.

Dr. C. Hubert Roberts congratulated Dr. Spencer on the result of his case with regard to the freedom from recurrence, and was quite in accord with him as to the value of the cautery in such cases. Dr. Roberts preferred Wertheim's method of abdominal hysterectomy in most, if not all, cases of cancer of the cervix as a means of more thorough removal of the disease, and especially the glands or parametrium if they were infected. Dr. Spencer's case was an early one, but it had been pointed out by many authorities that even in such cases the glands might be involved. Dr. Roberts strongly advocated the use of the cautery in destroying as much of the growth as possible *per vaginam* previous to performing abdominal hysterectomy. Shutting off the cancerous areas by Wertheim's clamp before removal was equally important, as both by this means and by the cautery he thought the chance of cancer-cell infection was lessened.

The President (Dr. Herbert Spencer), in reply, did not know on what grounds Dr. Roberts preferred Wertheim's operation in such a case. The result could scarcely have been better. With regard to the occurrence of secondary growths in the glands in early cases of squamous carcinoma of the cervix, Dr. Spencer remarked that such cases were rare (he had only seen two cases). As far as he knew the cases in which it occurred were peculiarly virulent, and he did not know of any case treated by Wertheim's operation, with excision of malignant glands, which had remained free from recurrence even five years after the operation.

Ovarian Dermoid retained Two Years in Pelvis after obstructing Labour.

By Alban Doran, F.R.C.S.

On February 20, 1904, Dr. E. F. Seager Green, of South Norwood, attended a woman, aged 29, in her third labour. The descent of the head was obstructed by a pelvic tumour. Dr. Green succeeded in pushing the tumour out of the pelvis, and the child was born alive. The patient's first labour (October, 1899) ended spontaneously, but the second (January, 1901) was lingering, and Dr. Green had reason to believe that the pelvic tumour was, as in the third labour, the cause of delay.

Six weeks after confinement, the patient was troubled with attacks of sharp pain in the right iliac region, so that inflammation of the appendix was suspected. The pain subsided and the patient was sent to me in June, 1904. I could not make out any morbid condition above the brim of the pelvis, but I found that the pelvic cavity was occupied by a firm elastic mass which had displaced the uterus forwards. The patient declared that the pain had been confined to a point which she carefully indicated with her finger, that point being McBurney's, but no resistance could be felt there on pressure. Contrary to my advice, she declined to undergo an operation, on the ground that she felt perfectly well and free from discomfort.

On February 2, 1906, the patient, then aged 31, applied to me once more. Since Easter, 1905, she had been subject to frequent attacks of abdominal pain, without distension, dysuria, or difficulty in defæcation. These pains were essentially acute, they almost "doubled her up," as she observed, yet always passed away. She informed me that at the age of 21 she had one distinct attack of hæmatemesis, for which she was dieted; this attack was her only illness previous to 1904, and I could not detect any evidence of gastric disease. On examination I found that the pelvic cavity was still occupied by the firm elastic mass which I had already noted in the same position in June, 1904. Its upper limits still lay below the pelvic brim, and it had hardly, if at all, increased in size.

I operated on February 13, 1906. The pelvic tumour proved to be a dermoid of the right ovary, weighing 1 lb. 5 oz. It was livid through engorgement of its veins, due to rotation on its pedicle, which was twisted two turns from left to right. The tumour had fallen back behind the uterus and left ovary, both being pushed upwards and forwards. Directly the pedicle was untwisted the lividity disappeared, and I found that the tissues of the pedicle were free from atrophic changes. Strange to say, there were no adhesions excepting a few shreds of soft, recent lymph. The vermiform appendix showed no signs of disease. As the tumour fitted closely into the pelvic cavity, I had to exercise caution in raising it above the brim, lest it should burst. In every other respect the operation was perfectly simple.

I last saw the patient on April 13, 1907, fourteen months after the operation. She was in very good health and quite free from any kind of discomfort. The catamenia were regular. The tumour now belongs to the Museum of the Royal College of Surgeons. It contained about one pound of grease, with hair of a light auburn colour. As usual, the hair in the tumour was much lighter than the hair of the scalp, as may be seen on inspecting the sample of the latter which is mounted with the specimen. Thus a dermoid tumour remained impacted, or all but impacted, in the pelvic cavity for two years without contracting any firm adhesions to adjacent structures. Hence there were no complications, such as infection from the bowel, and the tumour was removed without any difficulty. Although it fitted closely into the pelvic cavity it underwent axial rotation, but the clinical history and the condition of the pedicle seemed to imply that the lesion was partially reduced at the end of each attack. The pedicle being on the right side, it is easy to understand how the symptoms simulated inflammation of the vermiform appendix.

Mr. ALBAN DORAN, in reply to the President, stated that in this case the tumour had obstructed labour, but had not given rise to any pressure symptoms. It fitted quite snugly into the pelvic cavity. At the operation he made a long incision, not because the tumour was large, for it was clearly of moderate size, but because he had expected to find dense adhesions to the bowel, a dangerous complication, especially in dermoid disease. He desired plenty of room for the necessary manipulations, with as little risk as possible of the escape of grease, probably infected, into the peritoneal cavity. That was the reason why he made a large incision.

Rupture of an Early Tubal Gestation causing Death within a few Hours.

Shown by J. S. FAIRBAIRN, M.B.

Although this specimen has in itself no special interest, the clinical history of the case from which it was obtained seems worthy of mention before the Section. The specimen consists of a recently pregnant Fallopian tube showing a rupture of a little under an inch in length. The rupture has occurred in the upper and posterior aspect of the tube, about midway between the uterine and free ends. Here the tube has been distended by the growing ovum and its walls are much thinned, and its inner surface shows some rough tags where the ovum was attached, but the ovum itself is not present, and indeed was not seen when the specimen was obtained, as it probably escaped through the rent and was lost in the large amount of blood and clot which filled the abdomen and pelvis. It was obtained by Dr. Daniel, of Epsom, at a post-mortem examination made three days after death, and it is to Dr. Daniel that I am indebted for the particulars of the case.

The patient was a woman, aged 36, who had been married six years and had had one pregnancy, which ended in a miscarriage at the third month in October, 1906. The medical man who attended her at the time noticed nothing unusual, but the recovery from it was slow; she continued to lose blood for about three weeks, was well for one week, again became slightly unwell for another week, and then had a rather severe flooding which lasted for about a week, after which she was quite well and regular. The periods had always been regular, and it was an unusual thing for her to be even a day or two out of her reckoning. At the time of her fatal illness she was only one day over her time, but she felt sure she was three weeks pregnant because she had felt for three weeks exactly as she had previously when pregnant. On the day of her fatal attack she had come to Epsom on a visit to her sister-in-law and was in perfect health, except that she had had for a few days symptoms of what she thought was "indigestion." She had an ordinary meat lunch, and at 4 o'clock had gone upstairs and was preparing to return home, when she felt some gastric discomfort and pain and lay down on a couch for a time, shortly afterwards vomiting some partly digested food. About half an hour later she had diarrhœa and fainted. She was then (about 6 p.m.) carried to bed and was seen by a friend, a retired medical man, who was in the house at the time. He found her pale and cold and complaining of gastric pain, and as this, with the vomiting and diarrhœa, pointed to some gastro-intestinal irritation, her condition was naturally ascribed to something eaten at lunch and she was given hot brandy and water and treated by the application of hot flannels to the abdomen and hot bottles to the feet. For a time she showed some slight improvement, and her friends did not feel alarmed about her. Her sister-in-law said that she considered her very pale, "as pale as people generally are when they faint," but that she had seen her as pale as this before and had seen other people as pale. It was evident that at this stage the symptoms were not such as to alarm her relatives or the medical friend who saw her, and as he had but recently retired from practice, and when in practice was considered to be rather over-cautious and over-anxious, it may be taken that up to this point there was nothing in the patient's condition to suggest the gravity of the case. The first really ominous signs appeared only within an hour of death. She suddenly became colder at the extremities, and this, in spite of the constant application of hot bottles, increased and the pulse at the wrist almost disappeared. It now became evident that some serious internal hæmorrhage was taking place, and Dr. Daniel was summoned. Meantime an ounce of brandy was given in teaspoonfuls, with some temporary improvement in the pulse. The patient was extremely pale and conscious, but required rousing to answer questions, and became restless and dyspnœic. Hot injections of beef-tea into the rectum were tried, but she rapidly became collapsed and died soon after 10 p.m., about six hours after the first symptoms and a few minutes before Dr. Daniel's arrival. There was no hæmorrhage from the vagina.

At the autopsy, the abdominal cavity was found full of blood, mainly in the lower part and in the pelvis. The source of the hæmorrhage was found to be the ruptured left Fallopian tube which is shown this evening. The uterus was not perceptibly enlarged. A complete examination was not made, as permission was only given for a partial one.

All cases of rapidly fatal result from a ruptured ectopic gestation are of interest, for they are not of common occurrence, and this one is of especial interest in that the gestation was a very early one; the patient was only a day over her time, and she herself only estimated her pregnancy as of some three weeks duration, and that the symptoms, which only appeared some six hours before death, were at first very misleading, and, indeed, only within an hour or so of the end pointed definitely to internal hæmorrhage. Beginning as they did with epigastric pain, vomiting and diarrhœa, there was at first nothing to lead to a diagnosis of more than gastro-intestinal irritation with faintness, till the persistent pallor and coldness of the extremities and the progressive feebleness of the pulse made it evident that a more serious cause was present. Even the diagnosis of tubal rupture was difficult, as the history of preceding "indigestion" and the site of the pain, with the other gastro-intestinal symptoms, pointed rather to the possibility of the hæmorrhage being gastric or duodenal. Probably at first there was only a slight leakage, causing the pain, sickness and faintness, and only when the patient had begun to rally from the shock of this did the really serious hæmorrhage commence.

In face of a tragedy of this kind one cannot but feel how unfortunate it was that the early signs were indefinite, and that the opportunity of immediate operation was lost. The history makes one realise the difficulties in private practice of treating successfully these cases of cataclysmic intraperitoneal flooding unless the signs are manifest early in the attack. The time allowed for making a diagnosis, obtaining help, and making preparations for a major operation is so short that it is doubtful whether a case like this, in which the signs and symptoms were at first unrecognisable, and which so quickly ran its fatal course, could have been saved. Though rare, cases of the kind every now and then come to our notice. Personally I can recall two such, in both of which, after what was thought to be an ordinary miscarriage, the patient left home to recruit, and died within a few hours of the onset of the collapse. In one case the collapse occurred on the night of the patient's arrival in a county town, and death took place shortly after the surgeon arrived, prepared to operate; in the other the collapse occurred in a London hotel, where the patient was staying on her way to Wales, and death followed within two hours, and before any opportunity of surgical interference was possible. In both these cases the cause of death was verified by a post-mortem examination, and in neither was the pregnancy advanced more than two months.

In the early weeks an intact tubal pregnancy gives no warning of its presence, and it is not easy to see how a diagnosis can be made before bleeding into the ovum or leakage into the peritoneal cavity (either from the fimbriated end or from a small rupture) gives definite symptoms and signs of intraperitoneal mischief. When an extensive and sudden rupture with intraperitoneal flooding occurs without previous leakage, the physical signs are entirely wanting, and the symptoms are so trifling that there is really no warning till the collapse and shock indicate a serious internal hæmorrhage. Even examination of the specimen itself does not explain the occasional occurrence of these rapidly fatal hæmorrhages. Ruptured tubes like this have often been removed after giving rise to quite trifling bleeding, and it is not easy to understand what determines the amount and rapidity of the hæmorrhage. It may be that the ovum may plug the rent, or that fainting may allow of time for thrombosis. In this case the escape of the ovum may have allowed of freer bleeding than usual.

It is only by the publication of accurate and detailed records of the clinical history of these cases, and by their careful analysis, that we can learn enough to enable us to warn a patient of the danger of her condition, and be prepared to meet it as soon as a positive diagnosis can be made.

Dr. ARTHUR GILES said that he was very interested in the gastric character of the symptoms present in Dr. Fairbairn's case. He had had two cases in which a diagnosis of perforated gastric ulcer was strongly suggested. The first presented herself as an out-patient at the Chelsea Hospital for Women. She looked so exceedingly ill that she was brought into the consulting room at once. She stated that she had been under treatment for gastric ulcer for some months, and had vomited blood; but that she had been in comparatively good health recently, and was taken suddenly ill that morning about 7 o'clock. [It was about 2 o'clock when she was seen.] The possibility of a perforated gastric ulcer was under consideration when she went on to say that she had missed two monthly periods; and this led to immediate examination and a diagnosis of ruptured gravid tube. Presenting herself at the hospital as she did, the conditions for immediate relief were ideal, and within forty minutes of being first seen she had an artery forceps on her left ovarian artery. Although the operation took place within eight hours of the first symptoms, she was almost pulseless just before the operation, and about 3 pints of free blood were found in the peritoneal cavity. The second case was seen in consultation with a surgical colleague, Mr. Carson, at the Tottenham Hospital. They agreed beforehand that if examination led them to the conclusion that it was a gastric case Mr. Carson should operate, but if it appeared to be a ruptured tubal pregnancy Dr. Giles should operate, either being assisted by the other. Careful examination led them both to the definite conclusion that the case was gastric. Yet it turned out to be a ruptured pregnancy. The case was particularly impressed on him, partly because it was a case of cornual pregnancy, and partly because it showed that it was possible to mistake a case of ruptured tubal pregnancy when one was not only on the look-out for it, but even biassed by the wish that it might prove to be a case of this kind. Dr. Giles believed that in cases of early rupture the suggestion of a gastric condition was more frequent than one would be led to expect from what was written on the subject.

An Improved Demonstration Pelvis with attached Fœtal Skull for demonstrating to students the Mechanism of Labour.

Shown by H. Macnaughton-Jones, M.D.

The modifications were recently made in his original model, which had now been in use for a considerable time. He thought it contrasted favourably with that of Professor Selheim, which was of a more recent date. The instrument was made for him by Messrs. Mayer and Meltzer.

Unilateral Hæmatometra removed by Operation.

Shown by Thomas Wilson, M.D.

DISCUSSION.

Dr. Peter Horrocks enquired why the healthy uterus had been removed owing to the accidental opening of the uterine cavity. He had found that patients did quite well if the incision was carefully sewn up.

Dr. Griffith remarked on the unusual character of the specimen, and hoped it would be referred to the Pathological Committee for report. He felt it was unfair to criticise an operation which, no doubt, presented considerable difficulty, but he would ask Dr. Wilson why he removed the ovaries.

The specimen was, as suggested, referred to the Pathologieal Committee, and Dr. Thomas Wilson, in reply, repeated what he had already said in his description of the specimen, that he had made an attempt to divide the open cornu from the distended one through the septum, but that in doing so his incision had passed too much to the left, and divided the cavity of the undistended cornu completely across. Thereupon total hysterectomy was decided upon. An examination of the specimen would show that it would have been almost impossible to separate the hæmatometra and at the same time to leave a wall to the cervix of reasonable thickness. The question asked by Dr. Griffith as to the removal of the ovaries opened up the very large and still debatable question of the removal or preservation of the appendages when it is necessary to remove the uterus. To the solution of this question hitherto much *a priori* argument and little investigation had been devoted, and at a later period he hoped to furnish a practical communication on the subject.

Pregnant Uterus with Fibroid, the latter in a state of "Red Degeneration."

Shown by C. E. Purslow, M.D.

The patient had been pregnant once previously; on that occasion abortion occurred at the fifth month, and Dr. Purslow was called in by the medical man in attendance as there was a retention of the placenta, with severe hæmorrhage. Considerable difficulty was experienced in removing the placenta on account of the presence of a large fibroid. The patient was advised to have the tumour removed, but was not again seen until she thought that she was pregnant, when, as she was experiencing severe abdominal pain, she consulted her medical adviser and he sent her to the Queen's Hospital. The softer gravid part of the uterus could be readily distinguished from the harder fibroid portion. Abdominal supravaginal hysterectomy was performed, the wound healed by first intention, and the patient went home on the eighteenth day after operation.

The specimen, which weighs $6\frac{3}{4}$ lb., shows a uterus divided perpendicularly, containing in its upper part a fibroid tumour, spherical in shape and 6 inches in diameter. The surface of the tumour is deep red in colour and surrounded by a layer, about $\frac{1}{3}$ inch in depth, of normal white uterine tissue. Below the tumour is a gestation sac containing a three months fœtus.

Obstetrical and Gynæcological Section.

December 12, 1907.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

The Supports of the Pelvic Viscera: a Review of some recent contributions to pelvic anatomy, with a clinical introduction.

By W. E. FOTHERGILL, M.D.

I. CLINICAL.

IF asked to say how the pelvic viscera are supported in their usual position, a modern student of medicine describes all the structures which form the pelvic floor. Beginning, perhaps, with the external surface, he mentions skin, fat and fascia, the perineal body and the muscles that surround the anal and vaginal openings. Next he describes the pelvic diaphragm or its component parts, such as the levator ani and the pelvic parietal fascia. Passing on, he mentions the vagina itself, the pelvic visceral fascia, the ligaments of the uterus—broad, round, utero-sacral and utero-vesical—and ends with the peritoneum which covers them all. He concludes that the pelvic organs are partly propped up from below and partly suspended from above. But extended experience in gynæcological work cannot fail to show the observer that this teaching is not satisfactory. While true enough in a general sense, it lacks that accuracy which is essential if the clinician is to have a real grip of his work.

We learn, for instance, in the out-patients' room that extreme laxity of the perineal muscles can exist without descent of the pelvic viscera. We constantly see cases in which the perineum has been badly torn without any consequent alteration in the position of the uterus. Indeed, in cases of complete rupture extending into the rectum, it is quite exceptional to find uterine prolapse. The narrow lower opening of the funnel-shaped pelvic diaphragm is not to be felt so often as descriptions would suggest; and in parous women it is often difficult or impossible to recognise the margin of the levator ani. Even in virgins careful examination shows that the cervix uteri does not rest on the pelvic diaphragm any more than the bottom of a hansom cab rests on the ground.

Again, the vagina itself may descend without seriously affecting the position of the other pelvic viscera, for cystocele alone, rectocele alone, or the two combined may be observed with a normally situated uterus. Thus we are gradually driven to the conviction that support from below is by no means necessary to the pelvic organs.

Similar observations point to the conclusion that suspension by the ligaments of the uterus is even less important. Thus Winter[1] says: "The uterus can be drawn against the symphysis, pushed into the hollow of the sacrum, shoved against the side walls of the pelvis: the fundus can be raised almost to the navel, and the cervix can be pulled down to the vaginal orifice without causing any pain. It is therefore obvious that the peritoneum and the so-called ligaments cannot have any real influence on the fastening of the uterus." The utero-sacral ligaments, we may note, are scarcely recognisable on vaginal examination unless they are thickened by inflammatory deposits.

We learn much more about the so-called ligaments of the uterus during the course of operations by the abdominal route. By direct inspection, when the abdomen is open, we see that the broad ligaments lie loose and slack upon the subjacent structures, and have no supporting action whatever. As for the round ligaments, each takes a deep curve from its uterine cornu, downwards and backwards, before turning upwards and outwards again towards the internal abdominal ring. To afford support it would have to run a much straighter course. It is also worthy of note that the internal abdominal rings are at the sides, and not in front of the pelvis. In most cases the fundus is actually anterior to the line joining the two internal abdominal rings, so that tightening the round ligaments in a normal case would draw the fundus a little backward and not forward at all. The utero-sacral and utero-vesical ligaments are seen, on inspection, to be mere peritoneal folds. Thus the gynæcological surgeon looks at and handles the so-called ligaments of the uterus day after day with an ever-waning sense of their mechanical importance, and becomes convinced that the structures which are generally supposed to hold up the pelvic organs do not perform the functions ascribed to them except in a very minor degree.

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[1] *Lehrbuch der Gynäkologischen Diagnostik*, 1896.

But some definite structure or structures do hold up the uterus, vagina and bladder, both in normal subjects and in many whose pelvic diaphragms have been torn or stretched open below.

To the clinical observer, the nature of these real supports is revealed by the operation of vaginal hysterectomy. Suppose that an operator is about to remove a uterus whose only lesion is a small epithelioma of the cervix. Let him incise the vaginal wall right round the cervix, and, after opening the pouch of Douglas, let him freely divide the posterior attachments. Further let him separate the bladder completely from the uterus and make a wide opening into the utero-vesical pouch. The uterus cannot as yet be pulled down much more than before the operation was begun. The something which supports the uterus has not as yet been divided. Next let the operator deliver the fundus through the anterior portion of the incision. This affords another proof that the broad ligaments and round ligaments have no value as suspenders, for they come down freely and without being stretched. Let them be tied and divided, and the uterus still remains fixed by the tissue known as the parametrium, and by this alone. Until this is divided on either side the organ is, for practical purposes, as completely supported as before an incision was made.

The inevitable conclusion is that the vessels and other structures, with their sheaths or fascial coverings, which lie on either side of the uterus, below the broad ligament and above the lateral fornices, are the structures which support the uterus. These may correctly be called the parametria, for Virchow originally defined the parametric tissues as the loose fatless connective tissue, with abundant blood-vessels and lymphatics, which surrounds the lower part of the uterus and the upper part of the vagina.

If the uterus is supported by the sheaths of its blood-vessels, it follows that the bladder and the vagina are held in their typical position in the same manner, and of this operative experience gives ample proof.

The perivascular sheaths attach the pelvic organs to the sides of the funnel-shaped pelvic diaphragm. Without this firm attachment the plastic viscera would slip through its lower opening like sand through an hour-glass, like fæcal masses from the rectum, and like the products of conception from the parturient canal. The loosening of this attachment must be regarded as the one constant and essential factor in the causation of prolapse of the pelvic organs. Injuries to the perineum and levator ani doubtless straighten and widen the road from the pelvic cavity to the exterior. If the pelvic organs are freed from their attachments to the higher portion of the pelvic funnel, if they are coming down in any case, their descent is facilitated by injuries to the pelvic diaphragm and perineum ; but if the organs remain firmly attached above, no mere enlargement of the opening below will make them come down.

Further clinical evidence in favour of this view is afforded by those cases in which well-marked prolapse is cured by pelvic cellulitis. Again, it is into the tissue below the broad ligaments that chemical irritants have been injected, causing an artificial cellulitis and so curing prolapse. An operation has been devised by Alexandroff[1] for the same purpose, in which, after an anterior colpotomy, the parametric tissues are drawn together in front of the cervix so as to take up the slack. The designer of this measure has been followed by Dr. Hastings Tweedy, who has described a similar one.[2] Lastly, many operators consider that the success of vaginal hysterectomy, when done for prolapse, depends upon the taking of effective measures to secure good union between the parametria of the right and left sides.

It is thus clear that many gynæcologists have realised the truth of this matter; but the text-books which are in use are not clear on the subject, nor is a great deal of current clinical teaching any more explicit. This is doubtless because writers and teachers prefer to have a definite basis for their anatomical statements in the writings of professed and competent anatomists.

Authority of this kind is no longer wanting, for descriptive anatomy has recently changed in a way exactly parallel to that in which clinical gynæcology has moved.

II. Anatomical.

The so-called Ligaments of the Uterus.—The utero-sacral and utero-vesical folds demand no reconsideration from the anatomical point of view. The broad ligament is well known to be merely a mesosalpinx and mesovarium. Before passing on to the recent work referred to, it is perhaps worth while to dwell for a moment on the round ligament, and to call to mind the fact that this is a vestigial structure which plays its little part during the early months of fœtal life. Just as the gubernaculum pulls down the testis from its place of origin on the posterior wall of the fœtal body cavity, so the round ligament pulls down the ovary and the Müllerian tube. A peritoneal fold runs from the Wolffian ridge to

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[1] *Zentralbl. f. Gynäk.*, Leipz., 1903, xxvii., p. 362.

[2] *Journ. Obstet. and Gyn. Brit. Emp.*, 1905, vii., p. 349.

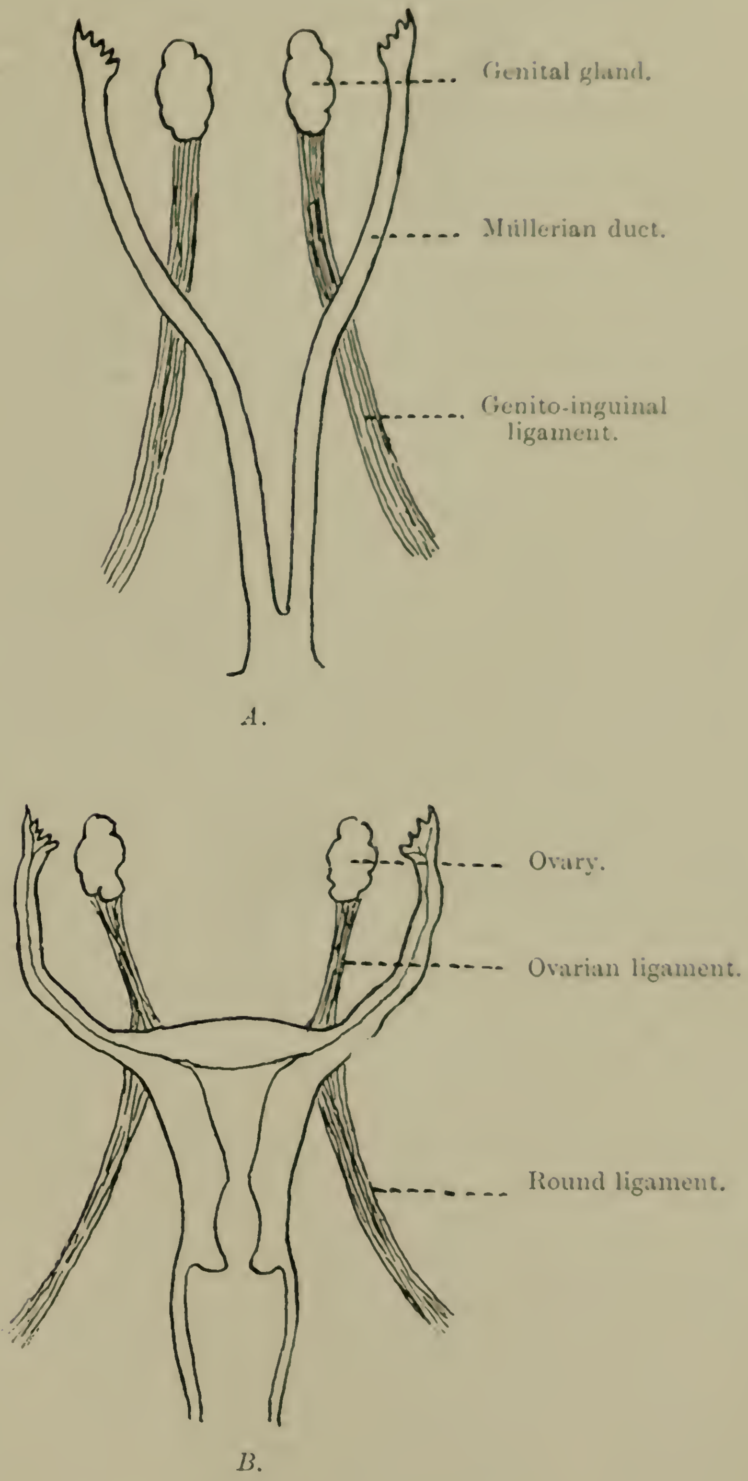

FIG. 1.

Origin of the round ligament. (*A*) Early relations of the genito-inguinal ligament, which forms the gubernaculum testis in the male and the ovarian ligament and round ligament in the female. (*B*) Later stage in the female.

the groin. From the rudiments of the transversalis and internal oblique muscles of the abdominal wall, muscle cells grow into this fold, and form a strand of tissue, the genito-inguinal ligament, which extends upwards towards the genital gland, and at one point crosses the Müllerian duct. In the female this strand of tissue forms the ovarian ligament and the round ligament. It is attached to the Müllerian duct at the point at which it crosses the latter. This particular point is that up to which, in the human subject, the two Müllerian ducts fuse to form the vagina and uterus. Thus the ovarian ligament and the round ligament are both attached to the uterine cornu, and when the growth of the body outpaces the growth of the ligaments, the ovary and the fundus uteri are drawn down into the pelvis. It would thus appear that the two names "round ligament" and "ovarian ligament" might well be given up, and that the term "*gubernaculum ovarii et uteri*" might well be applied to this structure, whose function is to pull the organs down during embryonic life, and not by any means to hold them up throughout post-natal existence. A structure whose origin and antecedents are of this nature can hardly be expected to occur with that constancy and uniformity of bulk which would be required to justify its use as a suspender in surgical work.

The Superficial Perineal Muscles.—Professor Peter Thompson[1] describes the pelvic floor as a compact mass in which may be recognised two distinct layers of muscles whose arrangement and functions are in striking contrast. "The upper layer . . . forms a more or less complete 'pelvic diaphragm'; the inferior layer, designed for purposes of control, forms sphincters for the openings of the canals which perforate the floor to reach the exterior. The two layers are not only functionally but morphologically different." In the lower or sphincter layer of muscles Thompson includes the sphincter ani externus, the transversus perinei superficialis, the bulbo-cavernosus, the ischio-cavernosus, the constrictor urethræ, the transversus perinei profundus and the ischio-pubicus. These superficial perineal muscles are to be regarded as derived from a layer of muscle known to embryologists as the *primitive sphincter cloacæ*—a muscular ring which surrounds the cloaca and has attachments to the bones at the pelvic outlet; and which, on the disappearance of the cloaca, becomes subdivided into groups, one of which surrounds the urino-genital canal while another encircles the anus. Thus the muscles of the lower layer in the pelvic floor have a common origin and a common sphincteric function.

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[1] "Myology of the Pelvic Floor," 1899, p. 8.

We must be very cautious in assuming that this sphincteric layer of muscles has any share in holding up the pelvic viscera. It is indeed improbable that the muscles surrounding the vaginal orifice support the uterus any more than the sphincter ani supports the rectum. If the uterus, bladder and vagina had no firm attachment to the sides of the pelvic diaphragm they would be liable to slip through the vaginal sphincter with every considerable elevation of intra-abdominal pressure. This, indeed, is what actually happens in many patients who have prolapse, but whose sphincters retain their functions. The uterus and bladder descend into the inverted vagina when the woman's bowels are moved or, perhaps, when she turns the mangle. When pushed up again the organs remain within the pelvis until another muscular effort drives them through the sphincter once more. To put the matter in another way: in a patient with a loose uterus, the sphincter layer just makes the difference between the "prolapse" and the "procidentia" of some books. But in a normal subject the sphincter layer has no action upon the uterus.

The Muscles of the Pelvic Diaphragm.—The muscles of the upper layer form, with their aponeuroses, the structure which was first named by Meyer "the pelvic diaphragm," a funnel-shaped sling encircling the pelvic viscera, deep behind, shallow in front, widely open above, and with a narrow outlet below. Dickenson describes it as a muscle shaped like a horseshoe, whose ends are attached behind the pubes, while the urethra, the vagina, and the anal canal pass between its right and left sides.

In four-legged animals with tails, certain muscles are inserted into and serve to move the tail. Those which raise the tail are of no present interest, but those which lower it and those which move it from side to side concern us deeply.

The muscles which lower the tail and pull it between the animal's legs arise from the inner aspect of the side walls of the pelvis, namely, from the back of the pubic bones and from the ilio-pectineal lines or the sides of the pelvis beneath it. They are inserted into the fronts of the vertebræ forming the tail, and are called the pubo-coccygeus and the ilio-coccygeus muscles. The tail-wagging muscles arise from the ischial bones and from neighbouring fasciæ, and are inserted into the sides of the caudal vertebræ. They are accordingly called the ischio-coccygei. These two sets of muscles are profoundly modified in animals which have lost their tails. In the human subject they are represented by the muscles of the pelvic diaphragm. The pubo-coccygei and the ilio-coccygei together form the levator ani, while the ischio-coccygeus is the coccygeus of human anatomy.

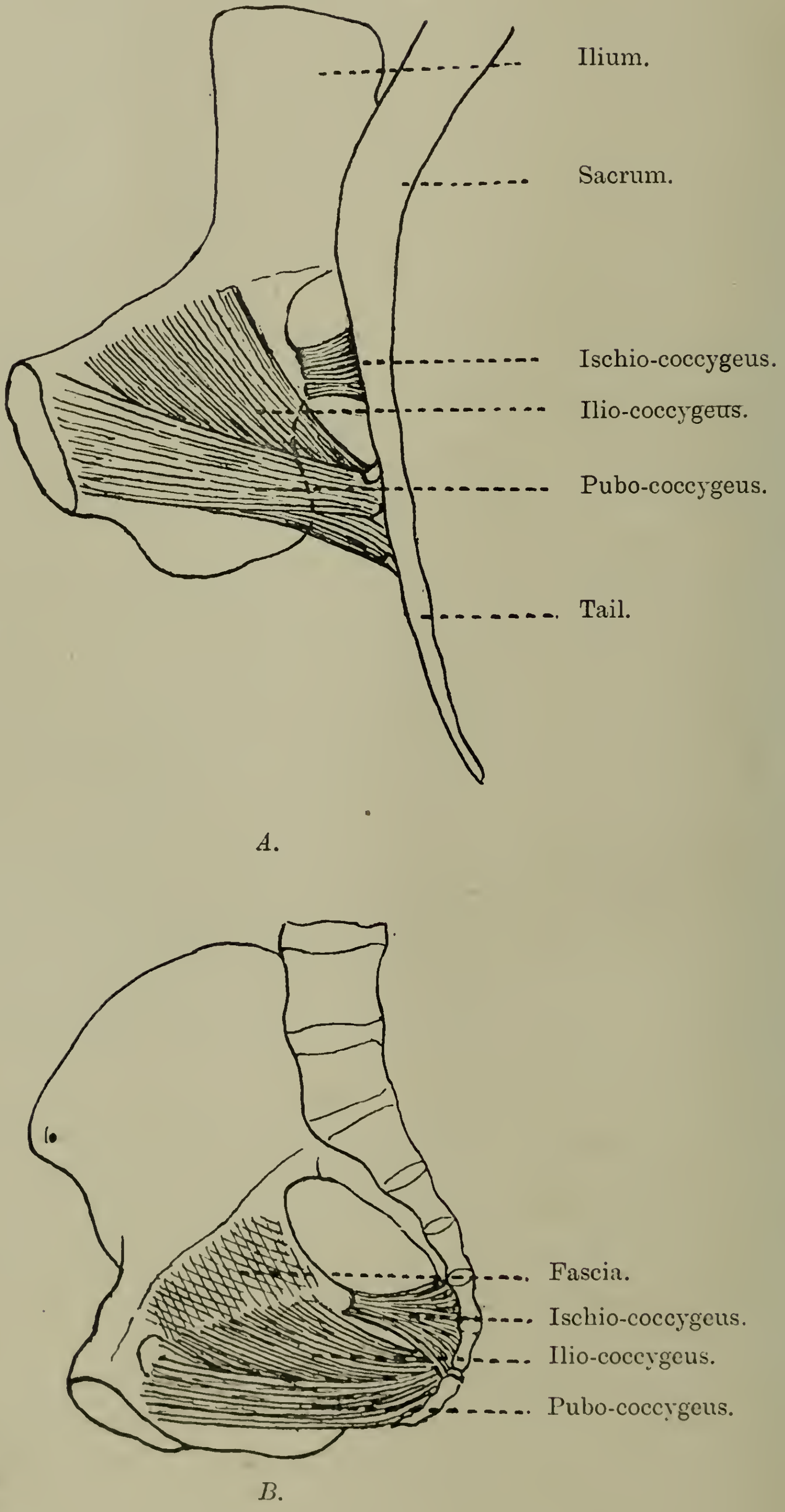

FIG. 2.

Origin of the levator ani. (*A*) Tail-moving muscles in an ape. (*B*) The same muscles in man forming the levator ani and coccygeus muscles. (After Keith.)

But, with the loss of the tail as a movable organ, the glory of these muscles has departed. Their insertions being reduced with the caudal vertebræ, and their range of movement being gone, they are indeed mere faint adumbrations of the masses of contractile tissue which subserve the locomotion of the prehensile ape and the tripod kangaroo.

Thompson says of the levator ani: "The dorsal portion of the muscle is wholly converted into fibrous tissue, so that only the lateral and ventral parts exist. There is also a great change in the thickness of the muscle. Whereas in tailed apes the levator ani attains a thickness of more than 5 mm., in anthropoids it is thin and almost transparent."

"In the human subject the origin and insertion of the pubo-coccygeus conform to what is constant in the lower mammals: it arises from the pubes and is inserted into the rudimentary caudal vertebræ. On the other hand, the muscle has been profoundly modified in such a way that, as its influence over the caudal vertebræ has diminished, its influence over the rectum has increased, and a large number of fibres, losing their connection with the coccyx, pass round the rectum to form a sling."

"In the human subject the ilio-coccygeus . . . may fail entirely or be replaced by fibrous tissue as in anthropoids, and only in a comparatively small number of subjects is the muscle strongly developed. It is usually thin and transparent, and the muscular bundles are separated so frequently by broad membranous intervals that . . . the ilio-coccygeus must be regarded as a degenerating muscle whose primary function has been lost. In virtue of its position, however, it contributes to the formation of the pelvic floor."

"Little difference is observed between the ilio-coccygeus in the male and female, and it is difficult to say in which sex degeneration of the muscle is carried to the furthest point. According to my dissections the muscle is usually thinner and more membranous in the female, though probably this is due to stretching of the muscle during parturition."

Of the coccygeus, or tail-wagging muscle, Thompson says: "As the tail becomes rudimentary the coccygeus tends to lose its muscular character and to become transformed into fibrous tissue. It is noteworthy, however, that in man the muscle is subject to considerable variation. In some cases the coccyx is strong and fleshy; in others the retrograde changes have taken place to such a degree that the fleshy fibres have disappeared altogether, and a thin fibrous layer on the deep surface of the small sacro-sciatic ligament represents the muscle."

Can it be seriously maintained that the contractile power of these degenerated muscles is of importance in holding the uterus, vagina and bladder in their normal position? The pubo-coccygeus, or lowest portion of the levator ani, remains functional, and by its action the rectum can be raised and drawn towards the symphysis; it also has an important sphincter action on the bowel; and, as Thompson has well shown, it co-operates with the sphincter vaginæ in narrowing the vaginal outlet. But as a muscle the levator ani probably has no further action. As a sheet of tissue it, of course, forms the major part of the pelvic diaphragm.

The Pelvic Fascia.—We must next dwell for a moment on the nature of fasciæ, and, in particular, the pelvic fascia, which has long been a bugbear to students and to teachers.

"It has been customary," says Keith,[1] "to regard fasciæ as separate structures forming distinct sheets with devious and complex courses. It is possible, by dissection, to prepare and display them according to accepted descriptions; but the structures so displayed are artificial, and not the true structures with which the surgeon or physician has to deal." Keith explains that the undifferentiated mesoblast forms the connective tissue or fascial system of the body. Thus the fasciæ and septa must constitute a continuous formation of sheaths, each being in continuity with that of every contiguous structure. "The pelvic fascia," Keith goes on, "is composed of the sheaths of four muscles—the levator ani, the obturator internus, the pyriformis, the constrictor urethræ and deep transversus perinei. The fibrous capsules of the vagina and uterus, the bladder, and the rectum also form part of it, the so-called visceral fascia."

Again, Derry remarks[2]: "The viscera, therefore, are simply invested by the remains, in this mesenchymatous form, of the tissue in which they originally developed, and the same applies to the vessels which supply them. This tissue is condensed in places to form definite ensheathing layers, particularly in the neighbourhood of the . . . vagina and lower part of the uterus in the female. But any attempt to give definiteness to such layers is not only artificial, but makes the description unnecessarily complicated and confusing, for the simple reason that these layers, though well marked in the regions named, and also round the rectum, pass gradually into the general mass of subperitoneal tissue which fills the whole pelvic cavity, and are then no longer traceable."

Cameron[3] says: "The fascia on the pelvic surface of the levator ani and coccygeus forms one continuous fascial plane in relation to these muscles, there being no actual splitting of this fascia into layers as is frequently described."

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[1] "Human Embryology and Morphology," 1902, p. 138.

[2] *Journ. Anat. and Phys.*, Lond., 1907, xlii., p. 104.

[3] *Journ. Anat. and Phys.*, Lond., 1907, xlii., p. 123.

We may therefore say good-bye to the pelvic fasciæ of classical descriptive anatomy, and may take it on good authority that the only fascia which concerns us is the aponeurotic covering on the inner or upper surface of the muscles which form the pelvic diaphragm, together with the fibrous investments of the structures which lie within it.

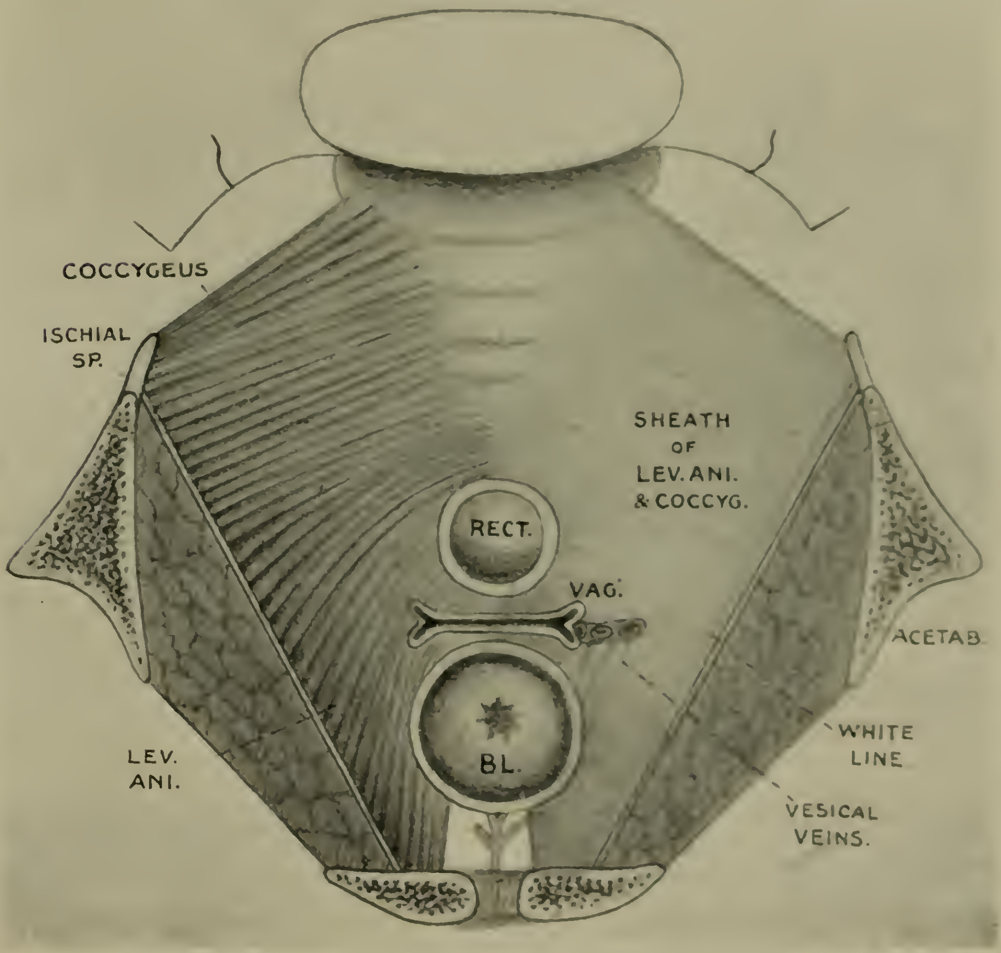

Fig. 3.

Cameron's Diagram of the Pelvic Diaphragm seen from above. *(Journ. Anat. and Phys.)*

We have now to learn how the pelvic organs are attached to the connective tissue which lines the inward sloping walls of the pelvic diaphragm, which could not, in virtue of their shape alone, support a plastic mass like that formed by the viscera they contain.

Professor Thompson[1] says: "At any rate we know that a fibrous sheath envelops the obliterated hypogastric artery and the vessels supplying the bladder, uterus, vagina and rectum, and it may be that the supporting layers of the pelvic fascia are primarily derived from this by lateral extension on to the fascia covering the upper surface of the levator ani."

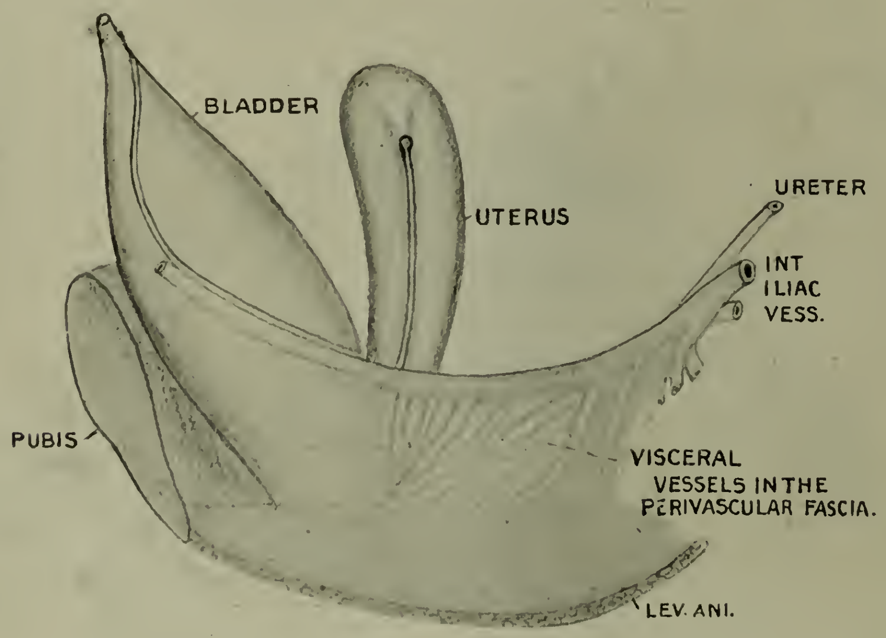

FIG. 4.

Diagram of the relation of the hypogastric artery to the uterus, vagina, and bladder in the fœtus. The vessel forms the upper margin of a mass of tissue whose firmest portion consists of perivascular sheaths. (Cameron: *Journ. Anat. and Phys.*)

Dr. John Cameron[2] writes: "It is most convenient to devote attention first of all to the internal iliac vessels. The anterior divisions, along with their visceral branches, are found to be bound together by a dense connective tissue—the perivascular sheaths. The resultant compact mass will be found to lie in a more or less vertical plane, and to possess fairly definite borders of attachment. Thus it was previously shown to be firmly united by its external border and antero-external surface to the innominate bone close to the sciatic notch, and, lower down, to the obturator fascia. From this origin the mass passes forwards and inwards along with the vessels to blend internally with the posterior part of the lateral aspect and base of the bladder, the seminal vesicles and the lower part of the rectum." "The upper margin is free, and contains the anterior division of the internal iliac artery with its continuation the obliterated hypogastric. Note particularly that the ureter is bound down by fibrous tissue, first to the upper border and then, as it approaches the bladder, to the posterior aspect of this mass. The lower margin is intimately blended with the sheath on the pelvic surface of the levator ani. *It may now be recognised that we have here a sort of fascial mesentery which must constitute an effective support to the pelvic viscera.* The fascia tends to become denser and stronger as it is traced downwards towards the pelvic floor. The latter part corresponds to the suspensory ligament of the genito-urinary organs recently described

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[1] *Journ. Anat. and Phys.*, 1901, xxxv., p. 141.

[2] *Journ. Anat. and Phys.*, 1907, xlii., p. 117.

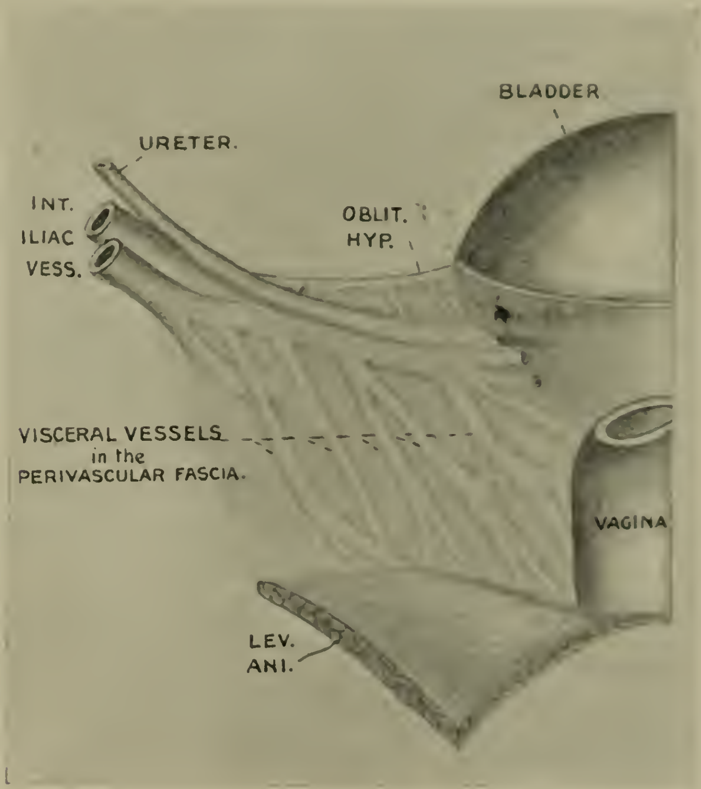

FIG. 5.

Diagram of the vascular structures and viscera in the female, with uterus removed. (Cameron: *Journ. Anat. and Phys.*)

by Paterson." "In the female the relative development of the connective tissue round the visceral branches of the internal iliac vessels is just as pronounced as in the male. The perivascular fascia is closely attached to the vaginal and uterine walls by the dense sheaths surrounding the vessels passing to these structures."

Derry, in the paper quoted above, gives a very similar description of the structures to which Cameron has directed attention. It is a remarkable coincidence that their papers both appear in the same number of the *Journal of Anatomy and Physiology*.

The recent anatomical work now cited has been foreshadowed in some degree. Thus Waldeyer[1] says: "It is clear that all those structures which are in relation to the uterus help to hold it in place—the vagina, the perineum, the parametrium, the perimetrium, specially the broad ligaments, the round ligaments, and utero-sacral ligaments; also the blood-vessels. The prime importance has been given now to one, now to another. In my own opinion," Waldeyer continues, "it is the vagina and perineum and, next, the blood-vessels with their firm connective tissue sheaths which should be named as of the first importance. I willingly agree that the parametric connective tissue plays a weighty part in fastening the uterus." In his enumeration Waldeyer mentions the blood-vessels last of all, and in expressing his personal opinion he gives the chief place to the vagina and perineum. Hohl, however, cut away, in the cadaver, both vagina and perineum without causing any change in the position or mobility of the uterus, thus affording a proof of the fallibility of Waldeyer's judgment.

Kocks[2] gave to the perivascular sheaths of the parametrium the importance of ligaments. He called them the *Ligamenta cardinalia*, and stated that they hold the uterus in position, and that it moves on them as on a transverse axis.

Mackenrodt[3] lays stress on the firm connective tissue sheaths derived from the pelvic fascia, which are interspersed with muscular fibres, accompany the uterine arteries and are firmly attached to the cervix. He named them the transverse ligaments of the uterus; but they are not transverse, and they are not ligaments, which is probably the reason why the work of Kocks and of Mackenrodt has not been universally accepted.

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[1] *Das Becken.*, Bonn, 1899, p. 368.

[2] "Die normale u. path. Lage und Gestalt des Uterus," Bonn, 1880.

[3] "Ueber die Ursache der normalen u. path. Lagen des Uterus," *Arch. f. Gynäk.*, Berl., 1895, xlviii., p. 393.

Relations of the Rectum to the other Pelvic Organs.—There is another point upon which light has recently been thrown, namely the relation of the rectum to the urino-genital organs. Professor Paterson[1] has pointed out the complete independence of the rectum from the other pelvic organs. He says: "The floor of the pelvic basin is constituted so as to provide a posterior rectal channel in which the rectum lies loose, and an anterior portion containing the genito-urinary passages, which are firmly fixed to the pelvic floor and walls by an investment of pelvic fascia." "The rectum, occupying the posterior section of the pelvis, is altogether free and separate from adhesions of the pelvic fascia, and lies loose in its special channel clothed by extra-peritoneal tissue." We have seen that the uterus, vagina, and bladder are attached to the sides of the pelvic funnel by the masses of tissue which carry their blood-supply. These run from behind forward, and Paterson's rectal channel lies between the two masses of tissue which support the other organs. The rectum has its main blood-supply from a separate source, and is supported by its own separate attachment to the back of the pelvic basin. These anatomical facts explain the well-known clinical observation that, in prolapse, the uterus, its appendages, and the bladder come down with the vagina, the posterior vaginal wall being separated from the anterior rectal wall and leaving the latter in its ordinary position.

Rectocele forms an apparent exception to this rule: but in this condition the anterior rectal wall is pathologically adherent to the posterior vaginal wall, owing to the formation of cicatricial tissue between them during the healing by granulation of infected lacerations of the perineum and posterior vaginal wall. When the recto-vaginal septum is thus matted into one sheet of tissue, distension of the rectum cannot be accommodated by sliding upwards of the rectal wall upon the vaginal wall. The result is that rectal distension bulges the recto-vaginal septum forwards and then downwards through the vaginal orifice.

SUMMARY OF CONCLUSIONS.

(1) The so-called ligaments of the uterus lie loosely upon the subjacent structures, and have no supporting action. The broad ligament is simply a mesovarium and mesosalpinx. The utero-sacral and utero-vesical folds are incapable of resisting downward pressure, as is the round ligament, which, moreover, is a vestigial structure (*gubernaculum ovarii et uteri*).

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[1] *Journ. of Anat. and Phys.*, Lond., 1907, xli., p. 93.

(2) The external muscular layer of the pelvic floor has a sphincteric rather than a supporting action.

(3) The internal muscular layer of the pelvic floor being the degenerated representative of the tail muscles of lower animals, has largely lost its muscular action: and the lower part of the levator ani merely acts as an adjuvant to the sphincters of the rectum and the sphincter vaginæ.

(4) The classical descriptions of the pelvic fascia should be given up, and the fascia should be regarded as the sheaths of the muscles, the vessels and the viscera.

(5) The internal muscular layer, with its fascial investment, forms the funnel-shaped pelvic diaphragm.

(6) The pelvic diaphragm does not support the pelvic organs by its muscular action.

(7) The pelvic diaphragm could not support the pelvic organs in virtue of its shape, were they not firmly attached to its sloping lateral walls.

(8) This attachment is accomplished by the fibrous sheaths of the blood-vessels and accompanying structures which supply the pelvic viscera. The one constant essential factor in the causation of prolapse is relaxation of the perivascular sheaths.

(9) The rectum has attachments to the back of the pelvis quite distinct from those of the urino-genital organs to its sides. It does not descend with them in prolapsus. When the anterior rectal wall descends in rectocele it is united with the posterior vaginal wall by cicatricial tissue, the result of infection during the healing of perineal tears.

DISCUSSION.

Dr. Amand Routh congratulated the author on his lucid and excellent discourse, and felt that it would be greatly to the advantage of both students and gynæcologists if the antiquated views so long held on the subject of the uterine support were replaced by those now elaborated. He thought that the author had succeeded in proving his contention that the uterus was mainly supported by the perivascular connective tissue bundles above the pelvic floor. He had put into words much of the scepticism which gynæcologists have held as to the acceptance of the orthodox views.

No one who was in the habit of opening the abdomen and of seeing the flaccid broad ligaments and the redundant circuitous round ligaments could hold the view that these structures support the uterus, whatever might be thought of the functions of the utero-sacral ligaments. He had long held the view that the connective tissue in the bases of the broad ligament and utero-sacral folds (which really unite and form one common connective tissue bundle at their junction with the supravaginal cervix) were very important agents in holding down the uterus to the floor of the pelvis. If in amputating the cervix *per vaginam* these bundles were cut through, the freed uterine body could not only be easily drawn downwards by traction, but would be spontaneously elevated behind the pubes if not held down by vulsella forceps. He thought, therefore, that the bundles of connective tissue grouped round the vessels and the ureters served rather as anchors to fix the uterus down to the pelvic diaphragm, preventing undue mobility both upwards and downwards.

The normal anteversion of the uterus was doubtless maintained, according to Dr. Fothergill's views, by the perivascular sheaths suspending the supravaginal cervix from a direction upwards and backwards (in the erect position), much in the same way as the utero-sacral folds had hitherto been supposed to act. He hoped Dr. Fothergill's views would receive general attention and acceptance.

Dr. R. H. PARAMORE said that, although he was not yet a member of this Section, he should very much like to make a few remarks on this subject, because it was one in which he was very much interested and because he disagreed almost entirely with what had been said. In determining the position of the uterus, and the maintenance of this position in the pelvis, they had to consider not only the structures which unite the uterus to the pelvic wall, and the pelvic floor itself, which supports the uterus, but also the intra-abdominal pressure, which had a definite influence upon the position of the pelvic viscera. The intra-abdominal pressure depended upon the capacity of the abdomen, the volume of the abdominal contents, and upon the condition of contraction of the muscles which enclose and form its boundaries.

It was Dr. Matthews Duncan who first laid stress upon what he called "the retentive power of the abdomen," and drew attention to the fact that the uterus did not alter its position as a result of complete rupture of the perineum alone, but that if prolapse occurred other factors had come into play. In these cases the maintenance of the position of the uterus in the presence of a damaged pelvic floor was the result of this retentive power of the abdomen, and was not solely dependent upon any ligamentous structure or peritoneal covering, nor upon any artery or nerve, nor upon the connective tissue which surrounded them. Dr. Fothergill had said that "the muscles of the pelvic diaphragm are vestigial structures," that "their muscular action is largely lost," that "this" (the musculo-membranous structure known as the pelvic diaphragm) "could not support the plastic pelvic viscera, either by its shape or its muscularity, if the pelvic viscera were not firmly attached to its side."

He entirely disagreed with this statement. The levator ani was a well-developed and powerful muscle. By passing two fingers into the vagina and palpating with the thumb on the skin over the ischio-rectal fossa, the muscle could be distinctly felt between the fingers and thumb as a muscular sheet of considerable thickness, and with a free edge which was plainly discernible. This palpation of the levator ani muscle was as simple to perform and as convincing as the similar palpation of the pectoralis major muscle with two fingers in the axilla and the thumb on the skin of the patient's chest.

In women who had not borne children, that was, in whom the pelvic floor had not been damaged, and in whom the intra-abdominal pressure was very much increased by a deposit of fat in the omentum, mesenteries and renal regions, and as a consequence of which the abdomen was very much enlarged and the abdominal muscles very much stretched, it was found very frequently that, on vaginal examination, the cervix uteri was so highly placed in the pelvic cavity that it was reached only with difficulty. This high position was the result of the activity of the levator ani muscle, which, in these cases, had become hypertrophied to meet the demands of an enormously increased abdominal pressure, and a corresponding increase in the downward thrust upon the pelvic viscera. If in these cases the pelvic floor was damaged (*e.g.*, by child-birth) an inevitable prolapse resulted.

Dr. BRIGGS believed that too much was attributed to ligaments. The muscular, tendinous, and other fibrous tissues around a joint controlled its security and mobility and produced its stiffness. The ligaments of the pelvic viscera were insignificant compared with the mass of the muscles and their fasciæ, the fibrous packing between, and the fibrous envelopes of, the viscera and canals.

Sir ARTHUR MACAN said that the importance of the pelvic connective tissue in the support of the uterus was pointed out years ago by W. A. Freund, and more recently a firm band in the lower part of the broad ligament (at each side of the cervix) had been differentiated by Kocks under the name "pars cardinalis ligamenti lati."

The effect of taking away the support from below could often be observed clinically in cases in which prolapse of the anterior vaginal wall followed rupture of the perineum. As the vaginal wall prolapsed it drew the cervix downwards and forwards, which produced backward displacement of the fundus, and finally prolapse. Prolapse of the uterus was also met with in old women, due to senile atrophy of the pelvic connective tissue removing the natural support of the pelvic organs. The strength of the support from below was, he thought, well shown by the resistance the pelvic floor offered to the expulsion of the child's head during labour.

The PRESIDENT (Dr. Herbert Spencer) thanked the author for the interesting and lucid communication he had brought before the Section. Although the question of the support of the pelvic viscera was one to be settled by anatomical research, anyone who had performed total abdominal hysterectomy and had noticed the "ligamentum transversale colli," which lay at a lower level than the uterine artery and was very dense in structure, would find it difficult to accept the statement that it was the sheath of the vessels which keeps the uterus in place. Also, how could the bladder be kept up by the sheath of vessels which were small in number and size?

A Cancerous Uterus and Glands removed by Wertheim's Method.

By C. Hubert Roberts, M.D.

The patient, a married woman, aged 37, was admitted under my care at the Samaritan Free Hospital for Women on July 5, 1907. She had been married six years and had had three children, the last being only six months old. Ever since her last confinement she had noted losses of blood which she did not think were quite natural, and for nearly the same period the discharge had been offensive. Her labour was easy and there was no mention of any growth of the cervix at the time of delivery. On admission her condition was good and there was no definite loss of flesh; the breasts contained secretion, although she had left off suckling nearly a month ago. On vaginal examination a very extensive malignant growth was found occupying the situation of the cervix, arising mostly from the posterior lip. It bled readily on touch and was very friable. The cervical canal was much expanded and the growth had involved the vaginal walls for a considerable area. The mobility of the uterus did not seem to be impaired, but a rounded mass could be detected in the region of the left appendages more or less fixed. This mass did not seem to be the broad ligament, and several of my colleagues who saw the case thought the swelling to be an enlarged ovary or tube. *Per rectum* the rounded mass was more plainly felt, but it was evidently fixed to the left side of the pelvic wall. No definite parametric thickening could be detected. Abdominal and bimanual examination did not reveal any secondary deposits or glandular thickening.

I decided to remove the uterus by Wertheim's method, and a thorough preliminary cauterisation was done on July 11. At the same time I also removed a large piece of growth from the posterior lip which, on microscopical examination, proved to be a squamous-celled carcinoma. The vagina was then packed with one per cent. formalin solution. The patient was very carefully prepared for abdominal section, and hypodermics of strychnia given for three days beforehand to guard against shock. I have found this of great service, and I also think it lessens the tendency to intestinal paresis in the first few days after a severe abdominal operation.

On July 14, vaginal hysterectomy being out of the question, I removed the uterus by Wertheim's method, and Dr. Cuthbert Lockyer kindly assisted me. On opening the abdomen the uterus could be drawn well up into the field of operation, but there was evidently considerable glandular involvement, mostly on the left side of the pelvis. Instead of an adherent ovary and tube on the left side the mass felt before operation was now found to be a large mass of glands deep in the pelvis in the region of the internal iliac vessels, but not quite fixed. In spite of this I decided to continue the operation. The ureters were easily found, and we did not experience any great difficulty in pushing the bladder off the supravaginal cervix or in ligaturing the uterine arteries. The vagina was exposed and clamped by Wertheim's right-angled forceps. I think the careful isolation and encapsulation of the growth *before the vagina is divided* is a most important step with regard to the possibility of preventing local cancer-cell implantation at the time of operation. The rest of the operation was much more difficult and involved a long and severe dissection of the infected pelvic glands. I removed the two large groups shown in the specimen. They were quite distinct and were intimately adherent to the great vessels in the pelvis, the upper and smaller groups being situated nearly at the brim. The vagina was left open except at each angle, and the peritoneal flaps closed over it in the usual way. No gauze drain was used. The patient suffered severely from shock for a few hours but soon recovered, and her subsequent progress was excellent, except for a small stitch abscess in the lower portion of the abdominal wound. The urine was drawn off with a catheter for the first ten days, after which the patient was able to pass it naturally. She left the hospital well on August 22, 1907. I have seen her twice since, and so far the local and abdominal condition is satisfactory.

The Uterus and Appendages.—The specimen consists of the uterus and the upper third of the vagina, together with the ovaries and tubes and a considerable area of the pelvic parametric tissue. The large piece of vagina removed shows the value of Wertheim's method, and, as I mentioned before, the operation was quite impossible by the vaginal route. The uterus was somewhat enlarged and measured 3¼ in. when fresh. In the region of the vaginal cervix was a large ragged area of cancerous growth (much of which had been destroyed by the previous cauterisation). The growth had spread to the vaginal fornices, but does not seem to have extended deeply into the tissues of the cervix itself. The ovaries and tubes appear normal. Two large groups of glands are seen which on section were of firm consistence and definitely encapsuled.

Histology.—Microscopic examination shows the primary growth of the cervix to be a squamous-celled carcinoma. The type is very malignant, though the tendency seems rather to involve the vagina than to spread upwards into the tissues of the cervix. The glands on section consist almost entirely of new growth identical with that on the cervix; very little normal gland stroma can be detected.

Remarks.—The specimen is of some interest as it shows very clearly how very severe in cases of cancer of the cervix may be the metastatic deposit in the pelvic glands. In some cases it is quite impossible to detect this before the abdomen is opened, though in my own case a definite mass could be felt by the vagina. This case also opens up the question of the justifiability of removing the uterus at all in similar conditions, and whether it would not be better, after opening the abdomen and finding glandular enlargement, to close the wound and do nothing further. Personally I am inclined to advise the removal of glands, but I regard extensive parametric fixity of the uterus as hopeless. Kiel has reported 4 cases in which there was extensive glandular metastasis, and which are still free from recurrence. As regards Wertheim's extended abdominal operation for cancer of the uterus, from a somewhat limited experience I am very favourably impressed, and as far as the immediate results of my operations go they have been good. I am inclined to give up vaginal hysterectomy altogether, but I feel that for Wertheim's method to give good results it will have to be used for all cases, and not merely for very advanced ones or where the vaginal route is impossible. The latest statistics of the operation are certainly encouraging.[1] The author there reports on 120 cases operated upon more than five years previously. Recurrence was noted in 53 out of 87 cases which had been kept under observation, but 61 per cent. of all cases operated upon had remained free from recurrence for five years. The absolute proportion of cures on Winter's basis was 25·6 per cent., and many of the cases had been very severe ones; only 24 would have been accessible by the vagina, and some others had been declined by other surgeons. There were 60 more cases free from recurrence for four years, and among cases longer under observation there had been no recurrence in the fourth year. Of these 60 cases two-thirds are still well, and if these are added to the other cases cured the absolute proportion of cases in Wertheim's series is increased to 32 per cent. Mackenrodt, also reporting on the extended operation, finds that of 144 cases which had survived from eighteen months to six years, cures might be claimed in 51 per cent. of all cases. Although most of Mackenrodt's cases were inoperable by the vagina, his mortality seems only to amount to between 5 and 10 per cent.

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[1] Wertheim: "The Extended Abdominal Operation for Cancer of the Uterus," *Münch. med. Wochensch.*, 1907, liv., p. 1341; also *Journ. of Obstet. and Gyn.*, 1907, xii., p. 484.

DISCUSSION.

Dr. VICTOR BONNEY said he had performed some of these operations himself, and had assisted Dr. Comyns Berkeley. No one in this country had had sufficient experience to make them dogmatic on points of technique. It was certain that the two great difficulties to be overcome were the length of time taken by the operation and the liability for the ureters to necrose when thoroughly freed. In regard to the first he thought an interchange of views and methods amongst the members of that Section would be helpful in indicating how time might be saved. In regard to the second difficulty he would like to know if the majority of the operators had entirely *freed* or merely *exposed* the ureters. In his opinion the first of these proceedings was the only thing to be done if a deliberate attempt was to be made to remove the cellular tissue in the base of the broad ligaments. But there was considerable risk of subsequent necrosis of the ureters. In one of his cases a ureteral leak and signs of ureto-pyelitis developed on the fifth day, which subsequently necessitated nephrectomy. The mere *exposure* of the ureters was easy, but he thought that there was no gain in this proceeding over an ordinary abdominal hystero-vaginectomy, which, if the parts were not fixed, could be effected without any exposure of the ureters. Such cases should not be described as examples of Wertheim's operation.

Dr. LEWERS said that, so far as his experience of Wertheim's hysterectomy went, one of the chief advantages of it had been that it enabled the operator to remove infiltrated parametric tissue, provided the infiltration were not too extensive. There were many cases of cancer of the cervix where a limited extension of the disease into the parametric tissue at one or both sides existed when the case first came under observation. Such cases were altogether unsuitable for vaginal hysterectomy, but in many of them hysterectomy by Wertheim's method enabled the operator to remove apparently the whole of the diseased tissue. Of course, it would be necessary to wait for the after-histories of such cases before the value of the operation could be estimated.

In his experience enlargement of the lymphatic glands not infrequently occurred apart from malignant infiltration. He had removed enlarged lymphatic glands in which subsequent microscopical examination showed that the enlargement was due to inflammation and not to malignant deposit.

It was certainly important not to separate the ureters more than was absolutely necessary. From the brim of the pelvis to the back of the broad ligament they should be clearly defined, but not separated too much from their attachments. At the sides of the cervix it was necessary to dissect them sufficiently free to permit of the ureters being drawn outwards, so that the whole of the infiltrated tissue could be removed without injury to them.

Mrs. BOYD spoke of a case in her practice operated on, as had been the practice for some years at the New Hospital for Women, by Kelly's method of abdominal hysterectomy, where the patient returned after fifteen months with enlarged iliac glands. The case had been a favourable one for radical operation and no glands were felt at the time. The abdomen was reopened in the hope of removing the glands, but they were found to be adherent to the iliac vein and softening, so that removal was impossible. She regretted not having removed the glands at the first operation, when it would probably have been an easy matter. Her colleague, Miss Aldrich Blake, had had a similar experience in reopening the abdomen to remove glands, and had had also to abandon the operation. She thought, therefore, that where the primary operation was not too difficult and long it was certainly better to go for the glands at the time.

Sir ARTHUR MACAN said he thought it was difficult to understand how, in Wertheim's operation, the parametrium could be extensively removed without separating the ureter considerably from its bed. The ureter received its blood-supply from special vessels, and so remained for a long time free from malignant infiltration. He recommended plugging the lower part of the pelvis with iodoform gauze, bringing the end of the gauze out through the vagina, as a good way of stopping bleeding from the remains of the parametrium, which was often troublesome. Abroad there was at present a feeling in favour of performing the radical abdominal operation in every case of cancer of the uterus.

Dr. CUTHBERT LOCKYER remembered examining Dr. Roberts's patient under anæsthesia before the operation. The most striking feature was a large, firm lump in the left posterior quarter of the pelvis. It lay high up in the true pelvis underneath the brim, and was thought by Dr. Worrall, of Sydney, N.S.W., to be an enlarged ovary. Dr. Lockyer favoured the view that it was a mass of cancerous glands, the unusual glandular enlargement being accounted for by acceleration of the spread of cancer incident on recent pregnancy. He further recalled the fact that this mass of glands shelled out of the fatty tissue beneath the peritoneum of the fossa ovarica with the greatest ease. There was a laxity of connective tissue which the recent gestation might account for. Passing to Dr. Bonney's remarks on Wertheim's technique, Dr. Lockyer explained the procedure as he had learned it by assisting Professor Wertheim himself. Dr. Bonney had particularly requested to know how the ureter was dealt with, and in reply Dr. Lockyer stated that Wertheim, like Kelly, laid great stress upon the necessity of leaving the ureter in contact with the supporting posterior layer of the broad ligament. At the side of the cervix and from thence onward to the bladder the ureter *had to be completely separated* and drawn aside in order to clamp and tie the parametric and paravaginal tissues outside the normal course of that duct; this meant that the ureter had to be displaced outwards as far as possible and the bladder held up whilst the broad parametric clamps were being applied. If, however, every care were taken to preserve intact the intimate vascular connection between the ureter and the utero-sacral fold, there would be no sloughing of that duct. It should never be seen stretching across the empty pelvis like a clothes-line. Dr. Lockyer agreed with Sir Arthur Macan that the ureter itself was not disposed to cancerous infection; but its dissection was not performed so carefully and thoroughly as Wertheim advocated, from any idea that it was in danger of infection, but solely for the reason that the operator had to displace it in its anterior or distal 3 in. in order to deal with the connective tissue bed in which it lay. Dr. Lewers had expressed the view that the prime advantage of the operation lay in the free removal of this parametric tissue. Dr. Lockyer thought it lay rather in the free vaginal dissection, which provided a capsule for the cancerous cervix and thus enabled the growth to be removed without its coming into actual contact with freshly cut surfaces. He practised the removal of parametric and paravaginal tissue as freely as anyone, and he also strongly advocated the removal of palpable glands, but so did Kelly and others who preceded Wertheim. His hope, however, for improvement in final results lay in Wertheim's plan of hermetically sealing up the cancerous cervix in a capsule formed of dissected vaginal wall.

Dr. BRIGGS (Liverpool) said that, in his experience, where the pelvic glands were as large as those shown, the lumbar glands were also involved, and the pelvic dissection was useless.

The PRESIDENT (Dr. Herbert Spencer) thought it would have been better if Dr. Hubert Roberts had waited until the after-history showed whether the patient had been cured. As far as he (the President) knew no patient in whom the glands were affected had remained well for five years after operation. He protested against the statement that 61 per cent. of Wertheim's cases remained well after five years. He had already alluded to this percentage fallacy in his Inaugural Address to the Obstetrical Society. (*Trans. Obst. Soc. Lond.*, 1907, xlix., p. 127.)

Tubercle of Cervix Uteri.

By PETER HORROCKS, M.D.

THIS uterus was removed by vaginal hysterectomy in Guy's Hospital about a month ago. The patient was aged 34 and suffered from pulmonary phthisis. The appearance of the cervix when seen through the speculum was peculiar. It was not like ordinary ulceration of a malignant growth nor like any form of erosion, but it was dotted over with greyish opaque vesicles with a red pulpy substance between, which bled easily on touching. It felt rather soft and velvety, and was so like a case seen years ago, which was diagnosed as follicular inflammation at first, and then, when a bit was snipped out and examined microscopically was thought to be sarcoma, and turned out, after vaginal hysterectomy, to be tubercle, that it was diagnosed as tubercle. A bit was removed, and this diagnosis was confirmed by microscopic examination. It was therefore a question whether, considering the presence of pulmonary phthisis, it was any use removing the uterus. Dr. Fawcett, of Guy's, was consulted, and gave it as his opinion that it ought to be removed. Considering that in all similar cases (not many) seen by the exhibitor the mucous lining not only of the cervix but also of the body and fundus of the uterus had been affected, having the appearance of plush velvet, it was not considered enough to remove the cervix alone. Therefore the whole uterus was removed and then it was discovered that the disease was limited to the cervix, and indeed only affected the lower part of it about the lips of the os uteri. The upper part of the uterus is bifid, which is probably a congenital condition.

The patient made a good recovery, but left the hospital too soon, in about fourteen days, in order to go and see her mother, who was ill.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) said that the tuberculated velvety appearance of the portio vaginalis in this case was new to him. Hysterectomy seemed rather severe treatment for such a condition, and might perhaps have been avoided by the application of the actual cautery, or by amputation with the cautery.

Sir ARTHUR MACAN said that cases of tubercle of the genital organs in women had been divided by Hegar into two classes: those of ascending infection, in which the disease came from below, and those of descending infection, in which it came from above. The theory of ascending infection had almost been abandoned in favour of the descending. In these latter cases we were generally able to feel small tuberculous deposits in the peritoneum in Douglas's pouch, and to find the condition of the tubes known as "salpingitis isthmica nodosa." He would like to know what was supposed to be the course of the infection in this case.

In reply, Dr. HORROCKS said he did not know the process of infection, but pointed out that, whilst tubercle of the uterus and neighbouring parts was uncommon, yet primary tubercle of the tubes was the commonest of these, and in them the mucous lining of the cervix and body of the uterus was generally free from tubercle.

A somewhat unique Tubal Gestation.

Shown by James Oliver, M.D.

The specimen is the right Fallopian tube incorporated with the right ovary. The tube is distended by blood and was the seat of a developing oösperm. The ovary is transformed into two thin-walled cysts.

The patient, aged 38, has been married eighteen years. She has had eleven children but no miscarriage. The last confinement took place three and half years ago, and twins were then born. Since this confinement menstruation has recurred with its wonted regularity. The last menstrual period began on September 17 and ended on September 22. On September 30, *i.e.*, eight days after the cessation of this menstrual period, patient stumbled over a broom but regained her balance without falling. On the following day she was astonished to find she had again become unwell, and complained of pain in the right iliac region. Towards the end of October as the hæmorrhage persisted, and there was still a dull aching pain in the right iliac region, she consulted her usual medical adviser, and he it was who sent her to me. When I saw her she was losing blood. Palpation of the abdomen was not satisfactory, as the anterior abdominal wall was kept rather rigid. Vaginally the cervix was located far back and towards the right wall of the pelvis. By bimanual examination the body of the uterus could not be clearly defined, but it could be outlined vaginally in an anteverted position. Through the right fornix a small swelling, the size of a cocoanut, was detected. This swelling rested partially on and projected from the posterior or upper surface of the uterus. In the anterior segment of the pelvis and close to the left border of the uterus was felt a small body the size of a pigeon's egg, and this I considered was the left ovary. Body temperature was not abnormal and the pulse numbered 86 per minute.

On November 11 I opened the abdomen mesially and removed the tumour, which was located in the right pelvis, and which is the specimen shown. There were no bowel nor omental adhesions, and there was no free blood in the peritoneal cavity. The tumour was adherent to the posterior surface of the uterus and the posterior surface of the broad ligament. The left ovary with its fellow tube were involved in adhesions. These readily broke down under the finger, and the left ovary was brought up and inspected. Nearly half of the surface of this ovary was deeply stained by old blood-pigment, and this ovary contained a corpus luteum. In removing the tumour nothing escaped from the tube but a small blood-clot, the size of a threepenny piece, which was forced from the fimbriated extremity when the ligature encircling the uterine end of the tube was tightened.

This case is unique on account of the many interesting points which it presents. During the first fourteen and half years of her married life the patient had borne eleven children. During the subsequent three and half years we note a period of infertility. This, however, is readily accounted for, as the husband, after the birth of the twins, resolved that he would endeavour to prevent fertilisation by withdrawing before insemination took place. This method of preventing conception, when practised, is in my opinion prejudicial to the well-being of the woman, and is occasionally a cause of ectopic pregnancy. With regard to the menstrual history there was in this nothing to arouse one's suspicion that conception had occurred; there was no consequent amenorrhœa. Of the existence of uterine pregnancy we are seldom suspicious until or unless a menstrual period has been missed. In ectopic pregnancy, however, we must not expect to find invariably this physiological sequence. The external hæmorrhage appeared at an unusually early stage, but this is attributable to the shock sustained in stumbling over the broom. I may here observe that the external hæmorrhage was arrested immediately the deranged tube was removed.

Before conception occurred the right ovary was probably in the state we now find it. What part, if any, this ovary played in the abnormal gestation it is difficult to say, but it is quite probable that a tube handicapped as this one was by its ovary might easily fail to fulfil efficiently its function. The left ovary had evidently been for some time the sole producer of ova. The corpus luteum was located in this ovary, and this, together with the fact that a large portion of the surface of this ovary was deeply stained with hæmatin, favours the view that possibly ever since the right ovary became transformed the left ovary had never been far removed from the right Fallopian tube. By the latter the spermatozoa had no doubt travelled, and they were attracted thither because the left ovary was as easily dominated by this as its own tube.

A Sarcomatous Ovarian Tumour co-existing with Carcinoma of the Uterus.

By Arthur H. N. Lewers, M.D.

The notes on the case and the description of the specimen will appear with the report of the Pathology Committee, to whom it was referred.

Uterus Bicornis Duplex, with Unilateral Hæmatometra.

By Thomas Wilson, M.D.

(*Shown at the meeting on November* 14, 1907 ; *see p.* 41.)

For many of the following notes I am indebted to Mr. G. P. Mills.

G.E., aged 16, was perfectly healthy until she menstruated for the first time about four and half months before her admission to the Birmingham General Hospital on September 2, 1907. Menstruation had occurred at regular intervals of twenty-eight days, the loss being free and lasting seven days. There was lower abdominal pain on the first occasion, and this gradually increased in severity at each subsequent period until at the fourth it caused fainting, and the patient had to stay in bed for a few days. The fifth period began thirteen days before the girl's admission to hospital ; it was accompanied by severe and continuous pain in the lower abdomen, varying in severity and usually worse at night ; at the onset vomiting twice took place. There was also "shooting pain down the back passage." Since the pain began the bowels had only been opened once, three days before admission ; micturition was painful, but not increased in frequency. The catamenial loss on this occasion persisted for ten days, and the pain continued until the patient came into hospital.

On the day after admission it was noted that "the patient is a healthy-looking girl of good complexion, but poor muscular development. The breasts and pubes are fairly developed. There is now no pain, and the temperature, pulse, and respiration are normal. The abdomen, not distended, is quite soft, and moves on respiration. A clearly defined smooth oval swelling, about the size of a hen's egg, is felt in the right iliac fossa, with its long axis transverse. The tumour can be moved easily about 1 in. up and down, but not from side to side: it is scarcely tender. *Per rectum* a rounded, smooth, firm elastic mass is felt occupying most of the pelvis. Bimanually this is found to be the lower end of an oval tumour about the size of a cocoanut, with its long diameter in the axis of the pelvis, and almost filling the cavity. The upper end of the tumour is continuous with that felt in the right iliac fossa. The vulva is normal and well developed, the hymen intact."

On vaginal examination, which was made on September 7, when the patient was anæsthetised for operation, the vagina was found to be well developed, single, running upwards and somewhat to the left of the middle line; the lower end of the tumour bulged downwards in the right lateral fornix. On the left side of the tumour, near its lower end, was a crescentic slit, about 1 in. in length, representing the external os, stretched antero-posteriorly over the convex wall of the swelling. Vagino-abdominal palpation confirmed the result of the previous recto-abdominal examination. The diagnosis was made of unilateral hæmatometra and probably right hæmato-salpinx with a well-developed left horn.

Operation.—In the Trendelenburg position a median lower abdominal incision was made, 4½ in. in length, with its lower end 1 in. above the pubes. On dividing the peritoneum the omentum was seen to be applied, but not adherent, to the structures in the brim of the pelvis, and, together with the neighbouring coils of intestine was stained of a slaty blackish colour, apparently by the contents of the hæmatometra escaping through the right Fallopian tube; this, together with the corresponding ovary, nevertheless appeared to be normal. The right upper tumour was found to be the distended right horn of a double uterus; it was of the size of a large hen's egg, and had a normal round ligament, tube, and ovarian ligament attached to its upper angle. The left horn, also of characteristic conical shape, was not distended, and had attached to it the normal left appendages. The vesico-uterine fold was slightly below the level of the bifurcation of the uterus. The large oval pelvic tumour was subperitoneal, and had opened up the connective tissue at the base of the right broad ligament, nearly as far outwards as the side of the pelvis. The right broad ligament was ligatured and cut through; the peritoneum in front was divided above the level of the bladder, and posteriorly was cut across near the upper end of the tumour. Enucleation was begun, but when nearly completed the wall of the tumour burst near the lower end, giving exit to several ounces of thick, tarry, altered blood, which was carefully swabbed away. An attempt was now made to divide the left uterus from the right by cutting downwards in the sagittal plane, the fingers and thumb of the operator's left hand being employed to guide the incision. In making this attempt the section was unfortunately carried completely across the undistended cavity of the left horn, and it was then decided to remove the whole uterus. The left broad ligament was secured, the left uterine vessels ligatured, and the vaginal insertion divided in the usual way. The vaginal and abdominal wounds were finally closed without drainage. The patient made an uneventful recovery, and left the hospital twenty-one days after the operation.

The parts removed consist of a double uterus with both sets of appendages. The ovaries are plump and well formed, and the Fallopian tubes normal; two small cysts, one with a long pedicle, are attached to the left broad ligament. The uterine body is divided into two horns, of which the right is much the larger. The left cervix is continued downwards over the left side of the large pelvic tumour, nearly to its lower end, where the external os is dilated into a crescentic slit with its concavity to the right. The vaginal fornices were obliterated. The attachment of the vagina bears the usual relation to the left cervix, and extends over a considerable portion of the adjacent lower end of the pelvic tumour. No trace of a right cervix, and no dimple or depression representing a right external os, can be made out. The lower end of the tumour burst during removal at a part of the surface a little distance above the attachment of the vagina.

Windows have been made in the anterior walls of the right uterine cornu and of the large pelvic tumour, and show that these are thick-walled muscular bags communicating with each other by a narrowed ring at the level of the internal os. This ring is of about the calibre of the thumb. The cavity of the lower tumour is much larger than that of the upper cornual one, and evidently represents the greatly dilated imperforate cervical canal. The mucous membrane lining both the cavities was, in the fresh state, dark red in colour, and on the whole smooth.

REPORT ON DR. WILSON'S SPECIMEN.

The Pathology Committee, to whom this specimen was referred, report:—

"We have examined this specimen and the microscopic sections supplied by the exhibitor, and by Dr. W. S. A. Griffith, and are of opinion that the large lower cavity upon the right side is entirely the dilated cervix, and that it has no communication with the vagina. Also, that the part on the left side is, as described by the exhibitor, entirely cervix."

HERBERT R. SPENCER (*President*).
G. BLACKER.
ARTHUR E. GILES.
CORRIE KEEP.
W. S. A. GRIFFITH (*Chairman*).

Obstetrical and Gynæcological Section.

January 9, 1908.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

Enucleation during the seventh lunar month of Pregnancy of a Uterine Fibro-Myoma weighing 17½ lb. Premature Labour two days later.

By HERBERT WILLIAMSON, M.B.

ON December 15, 1906, I was asked by Dr. Fowler, of Epping, to see a lady in whom pregnancy was complicated by the presence of an abdominal tumour. The patient was 32 years of age and had been married for fifteen months. Menstruation commenced at 14. The periods had always been regular every twenty-eight days, had lasted six days and the amount lost had never been excessive. The date of the last period was June 15 to 21, 1906. Shortly after this the patient became pregnant and from that time no vaginal hæmorrhage occurred. Previous to conception she was in her usual health, had not noticed any enlargement of the abdomen and had not found it necessary to loosen her clothes.

Towards the end of September, 1906, in the fourth month of her pregnancy, whilst engaged in her household duties, the patient was seized with acute abdominal pain. The pain did not cause vomiting, but was so severe that she was unable to stand upright. She went to bed and remained there for two days, the pain gradually subsiding. A few days later, in the early part of October, the pain was so much less that she undertook a short railway journey, and whilst in the train was seized with another attack similar to the last, though more severe. She was unable to sit or lie down, but had to finish the journey standing up, clinging to the carriage door. On reaching her destination she was put to bed and remained there for six days, but gradually recovered and, at the end of another week, was able to return home. To use her own words, "the journey home seemed to bring back the pain." For a fortnight she was confined to her bed, and from that time until I saw her, some five weeks later, was unable to leave her room. There was rapid loss of flesh and the abdomen became distended to such a degree that it was impossible to lie down with comfort. Fœtal movements were felt in November and from that time onwards.

On December 15 I made the following note: "The patient looks ill and is anæmic; she is very thin, almost emaciated. The tongue is furred. Temperature 99·5° F. Pulse 100, of poor volume. When lying down there is grave difficulty in respiration. The breasts are active and contain secretion. The abdomen is enormously distended, the skin over it tense and shining, a number of large dilated veins are seen on the surface. On palpation the abdomen is tender all over. Two tumours can be detected. The larger lies to the right; it is hard, feels solid and nodular on the surface, extends upwards for a considerable distance beneath the costal margin and has displaced the diaphragm, causing respiratory embarrassment. It reaches well beyond the middle line and descends into the pelvis. The second tumour lies to the left and below; its limits cannot be accurately determined, for it is overlapped by the one just described; it lies over the left iliac fossa and bulges the abdominal wall outwards in the left flank. Its consistence is soft and elastic like that of the pregnant uterus; fœtal parts cannot be distinguished, nor can the fœtal heart be heard. The uterine souffle is clearly audible. *Per vaginam:* the cervix is soft and lies high up to the left, the finger can be introduced through the os internum, the bag of membranes can be felt and in this a child's foot, which moved on touch. *Bimanually:* the tumour to the right rests upon the pelvic brim, whilst the lower pole projects into and occupies the right half of the pelvic cavity. The tumour to the left is identified as the pregnant uterus."

As to the nature of the mass to the right I was in grave doubt, but thought it was probably a rapidly growing malignant tumour of the ovary. The reasons which led me to form this opinion were briefly these: (1) the rapidity of growth was in favour of a tumour of the ovary rather than of the uterus, but the tumour felt too hard and inelastic for a cyst; (2) I could not satisfy myself that the tumour was definitely connected with the uterus; (3) the cachectic appearance of the patient, the rapid loss of flesh and the evidence of a toxæmia were in favour of a malignant growth.

In spite of this view I urged strongly that an exploratory operation should be undertaken, because it was clear that the patient would soon die of respiratory trouble if nothing were done, and also that delivery of the child *per vias naturales* was an impossibility. The patient and her friends consented to my proposals and she was brought up to town on an ambulance.

On December 19 I opened the abdomen by an incision in the middle line. The incision was subsequently enlarged so that it extended from 2 in. above the pubes nearly to the ensiform cartilage. When the abdomen was opened two tumours presented, the pregnant uterus, deep red in colour, lying below and to the left, and a large nodular growth lying to the right extending upwards beneath the costal margin and downwards into the brim of the pelvis. The tumour was adherent to the parietal peritoneum, to the bowel and omentum, but the adhesions were easily separated. I found that the growth was a fibro-myoma attached to the right side of the anterior aspect of the uterus by a pedicle rather thicker than a man's wrist. After separating the adherent viscera it was brought out of the abdomen without difficulty and enucleated from the uterine wall. I do not think I opened the uterine cavity during this procedure, but the mucosa was exposed. Free hæmorrhage occurred from the cavity left in the wall of the uterus after enucleation. So free was the bleeding that I feared it would be necessary to complete the operation by performing Cæsarean section, and possibly hysterectomy. Eventually, however, by underpinning the whole of the raw surface and closing it in by means of catgut sutures, the hæmorrhage was arrested. The abdominal wound was closed by through-and-through sutures, with a separate layer for the fascia.

For forty-eight hours the progress was satisfactory, but on the morning of December 21 labour-pains commenced, and after a short and easy labour the patient was delivered of a six months child, which lived only eighteen hours. There was no post-partum hæmorrhage, but with the expression of the placenta two masses of dark blood-clot, each the size of a hen's egg, were expelled. These clots were evidently two or three days old, and I have very little doubt that during the manipulation of the uterus I partially detached the placenta. To this accident is to be attributed the onset of labour. From this point convalescence was uninterrupted, and the patient returned home a month after the operation. I noticed a number of fibroids in the wall of the uterus one the size of a Tangerine orange and two or three others nearly as large as this. When the patient came to see me six months later the uterus had involuted well and the whole mass, uterus and fibroids, was no larger than a man's fist. There can be no doubt that in this case the individual fibroids were much smaller six months after delivery than at the time of labour.

I show to-night a portion of the tumour removed. Its weight was 17½ lb., its length 12½ in., its breadth 9 in., and its circumference 25 in. On section it is seen that the tumour is degenerate, more especially towards its centre. Areas of mucinoid degeneration, cyst-like cavities, and patches of necrobiotic tissue are scattered through it. Microscopical sections show the histological appearance commonly seen in a degenerating fibro-myoma. These call for no special description.

I have related this case because of its clinical interest and because it is important to record instances in which premature expulsion of the ovum follows operations upon the uterus during pregnancy. So many cases have been published of pregnancy continuing in spite of the enucleation of uterine fibroids that a false idea of the safety of the ovum may become prevalent unless our failures are recorded also. I do not mean to imply that abortion is the rule, but it occurs with sufficient frequency to make me hold that a fibroid should not be enucleated during pregnancy unless it causes, or clearly threatens to cause, urgent symptoms. The rate of growth is remarkable. I have not the least doubt that the tumour existed long before the commencement of pregnancy, but it had been noticed neither by the patient nor her friends. Its increase in size must be attributed to two factors: (1) the richer blood-supply of the uterus associated with gestation, and (2) the degenerative changes in the tumour —partly mucinoid, partly necrobiotic. It is clearly established that fibroids are particularly liable to undergo degenerative changes during pregnancy; why this is so we do not know. Necrobiosis is generally regarded as the result of vascular lesions, but as to what is the nature of these lesions, or what are the factors which determine their onset, we possess no certain knowledge. The process is, as far as we know, neither infective nor thrombotic, and it is difficult to explain why it should occur at a time when the vascular supply of the uterus is richest. The onset of the symptoms was strikingly sudden. At the time of operation I looked carefully for torsion of either the tumour or the uterus, but I could find none. There was extensive local peritonitis, and this may account for the severity of the pain in this case, but a necrobiotic fibroid is often *per se* a painful tumour, and in some instances where the pain has been great no adhesions or other evidences of peritonitis have been found. The constitutional symptoms, the raised temperature, the frequent pulse, the furred tongue, and the loss of flesh are evidence of the profound toxæmia associated with the change. Finally, I would draw attention to the fact that during the involution of the uterus the fibroids in its walls became smaller.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) agreed with the author that interference was rarely necessary or advisable in cases of myomata complicating pregnancy. In cases like the one exhibited operation was, of course, imperative. He had published (*Obstet. Soc. Trans.*, vol. xlvi., p. 122) a similar case in which he had enucleated a slightly larger tumour from the broad ligament at term. He noticed that the title of the paper stated that the operation in Dr. Williamson's case was "during the seventh month" of pregnancy. This might lead to some confusion, as the patient had not quite completed the sixth *calendar* month of pregnancy, and it was by calendar months that the duration of pregnancy was usually reckoned in this country. There were, he thought, advantages in reckoning by calendar months when the exact duration of pregnancy was not given; where accuracy was important the duration should, of course, be expressed in weeks.

Dr. JAMES OLIVER, in referring to Dr. Williamson's case, stated that he had operated upon a very similar case last year. The patient, who was aged 43, had been married eighteen years, and had never before been pregnant, and Dr. Oliver naturally was extremely anxious to enable the patient, if possible, to carry the child to full time. The intestines and omentum were extensively adherent to the tumour, the pedicle of which was short and thicker than one's wrist. To allow for the retraction of uterine tissue from the tumour when the influence of the latter was withdrawn the formation of the flap of the stump was begun about 3 in. above the base of the tumour, and enucleation was thereafter effected. Several vessels were ligatured within the peritoneal cup. In spite of the great care exercised in removing as little uterine tissue as possible with the tumour this patient unfortunately aborted forty-eight hours after the operation. She was nearly four and a half months pregnant.

Mrs. BOYD suggested that as the tumour so successfully dealt with by Dr. Williamson was evidently a truly submucous tumour, and as the bed of enucleation must have been a large one, it was possible that clot had formed between the stitches and mucous membrane, over which the mucous membrane had sloughed from malnutrition, and that the clot, thus extruded into the uterine cavity on the second day, had started the premature labour. She had seen a copious discharge of blood occur in this way after myomectomy on the non-pregnant uterus. She thought Dr. Williamson much to be congratulated on the soundness of his suture of the uterine wall, which evidently bore the strain of labour without disturbance, and she asked whether he used catgut in his outer layer as well as in obliterating the bed.

Dr. AMAND ROUTH considered that Dr. Williamson had correctly treated his case by enucleation, thus giving the woman a chance of going to term and having a living child. The opinion had been often expressed that if more than one large fibroid was present, or if there were numerous small fibroid nodules besides the particular one for which the abdomen was opened, hysterectomy should be performed instead of myomectomy. He thought this quite wrong. He agreed with the author that premature labour followed enucleation of fibroids in pregnancy more often than text-books implied. He mentioned a case where he had removed a pedunculated fibroid of large size at the eighth month of gestation where the symptoms were those of torsion of an ovarian cyst, and where, on opening the abdomen, the tumour was found to be a fibroid with a twisted pedicle. In that case premature labour ensued on the eighth day.

Dr. MACNAUGHTON-JONES said that there was no question that the weight of gynæcological opinion generally was on the side of non-interference in these cases. A mass of evidence and statistics proved that it was safer for the woman and the child not to interfere, but there were obvious exceptions to this, as in the case they were discussing. He was now, of course, referring to pedunculated myoma. He instanced a case in which, at the fifth month, symptoms of peritonitis appeared, with great abdominal tenderness, and it became necessary to operate. The removal of the tumour was effected without any difficulty or post-operative trouble in the wound, but the fœtus died during the woman's convalescence and the womb had to be emptied.

Dr. MAXWELL asked Dr. Williamson if any attempt had been made to investigate the nature of the toxin evolved in these degenerating fibroids. There seemed to be complete agreement on one point: that it was not of pyogenic source; but as to its real nature there was some difficulty of proof. It had been stated in work laid before this Section that the toxin was a chemical body—an amine—which might be recognised by its characteristic offensive fishy odour. Several specimens of this type of degenerating fibroid had passed through Dr. Maxwell's hands (as an assistant museum curator), but in no case, though the specimens were submitted to competent chemical investigation within half an hour of removal, had such a chemical body been demonstrated.

In reply, Dr. WILLIAMSON said that with all due deference to the President he maintained that the title he had given his paper was the correct one. To speak of the stage of pregnancy in terms of the lunar rather than the calendar month was both scientific and rational. The ordinary menstrual cycle was that of one lunar month, and the duration of pregnancy was ten menstrual cycles: this was the nomenclature adopted by Continental and American writers, and he thought that in scientific papers, whenever possible, a common nomenclature should be employed. In reply to Mrs. Stanley Boyd he said that all the sutures used in the uterus were of catgut sterilised by boiling for twenty minutes in absolute alcohol under pressure; and in reply to Dr. Maxwell, that no chemical examination of the tumour had been made.

Hæmorrhage into the Pons Varolii as the Immediate Cause of Death in the Eclampsia of Pregnancy, with Illustrative Cases.

By Norman C. Carver, M.B., and John S. Fairbairn, M.B.

The case which forms the basis of this paper was admitted to St. Thomas's Hospital as one of eclampsia with coma; it was treated as such, and the extensive hæmorrhage into the pons varolii, which was the immediate cause of death, remained unsuspected until it was revealed at the post-mortem examination. This unexpected discovery of the nature of the coma in a case which we had considered to be one of the ordinary eclampsia of pregnancy led us to look into the question of the occurrence of such hæmorrhages in fatal cases of eclampsia, and we have thought that our experience in this case, and the results of our investigations into the similar cases already recorded are of sufficient interest to merit discussion before the Section.

We will begin with an account of our own case. The patient, who lived in the hospital out-door maternity district, was a primigravida, aged 24, about five months pregnant. On the evening of March 23, 1905, her card was sent up to the hospital as she was suffering from vague pains, and the obstetric clerk on duty visited her and reported her condition on his return. She was then seen by one of us. Her mental condition was quite good, and she gave a history of loss of appetite, sleeplessness, headache and spots before the eyes for two or three days. There had been no vomiting and no fits. She had noticed nothing abnormal about her urine, and considered that the amount passed had been as usual. There was œdema of the whole body, which was said to have been present for one week, but up to this time she had been able to do her ordinary household work. The uterus reached to the umbilicus and the fœtal heart was audible. The temperature was normal, the pulse-rate 84; the arterial tension was considerably raised. A catheter specimen of the urine was obtained, and was found to contain so much albumin that it became solid on boiling; there was no blood shown by the guaiacum test. The patient was ordered to keep her bed and was given a saline purge, and arrangements were made for her admission to the hospital on the following morning.

On March 24, at 1.20 a.m. (*i.e.*, about six hours after she was last seen), the husband woke up and found the patient unconscious, and lying on the floor on her face and knees. He said that he had noticed her hand twitching before he had gone to sleep, and that evidently her falling on the floor had wakened him. As soon as he had got her back to bed he came up to the hospital for help. When the patient was seen by one of us about 2 a.m. she was cyanosed and quite unconscious; respiration was shallow and inclined to be of the Cheyne-Stokes type; pulse 84, tension very high; all reflexes were absent, no unilateral symptoms were noticed and no twitching; the pupils were equal and moderately dilated. An ambulance was procured at once and the patient removed to hospital. On her arrival in hospital the pulse was found to be much weaker and the respirations to be more markedly of the Cheyne-Stokes character. She was bled from a vein in the arm and 10 oz. withdrawn, and afterwards four pints of normal saline solution were infused, but without any improvement, her condition being extremely grave during the periods of apnœa. Rapid dilatation of the cervix was carried out by means of metal dilators, followed by de Seigneux's modification of Bossi's dilator, and a fœtus of about five months extracted by version. The child was living, and gasped for a few minutes after delivery. The patient's condition did not improve in any way and she died at 7.15 a.m., without recovering consciousness. Unfortunately the specimen of urine obtained before the onset of coma was not kept, and as no other was available it is not possible to give any further details of the examination of the urine.

The following are the notes of the autopsy which was made on the following day by Dr. Powell White:—

There was some anasarca, especially of the lower limbs.

Brain.—There is an extensive hæmorrhage into the substance of the pons, which is greatly torn and disorganised. The hæmorrhage passes up for a short distance into the crura cerebri. The rest of the brain is normal. There is no evidence of disease of the cerebral arteries, nor was any sign of arterial disease found in any other arteries in the body.

Chest.—Both pleural cavities contain some excess of clear fluid. Lungs and heart normal.

Kidneys.—These organs are not much altered to the naked eye. The cortex is pale and fatty, and the pyramids are distinct. The capsule strips easily, leaving a smooth surface. Microscopically, under the low power, many of the glomeruli are seen to be surrounded by a ring of connective tissue. Many of the tubules are swollen, and in places the epithelium is swollen and necrotic. In one part of the section the tubules have been almost obliterated by a mass of recent white fibrous tissue. Under a high power the connective tissue which has infiltrated the glomeruli is seen to be rich in nuclei and of recent origin. Numerous young fibroblasts are present. There is extensive degeneration of the epithelium of the convoluted tubules. The cells are greatly swollen and show evident granular degeneration. In places the nuclei have entirely failed to take up any stain. In a few tubules the cell outlines are no longer visible and the lumen is obliterated by granular *débris*. The straight and collecting tubules have escaped change. Some fine fatty degeneration was found in a few scattered tubules after special staining. These changes suggest an acute degenerative process following on a slight chronic interstitial change.

Liver.—This organ weighed 50 oz. and was normal in size, shape, and consistence. On the surface and on section it presented some map-like irregular red patches, varying from the size of a crown piece to that of a sixpence, and having a fairly distinct margin. Microscopically, under a low power, numerous blood-containing spaces are seen scattered through the liver substance. The blood spaces are surrounded by fibrous tissue and are arranged in groups. In the immediate neighbourhood of each group of blood channels the liver cells are flattened and elongated. With this exception the liver cells are normal in appearance. There is slight proliferation of the connective tissue cells along the portal canal and around the larger groups of blood spaces. These groups of blood spaces appear to have an interlobular arrangement and to be developed in connection with a branch of the portal canal. Under a high power the blood spaces are seen to be bounded by a single layer of flattened endothelial cells surrounded by a definite ring of connective tissue. The contained blood appears normal. There is no evidence of fibrin formation or of the presence of an undue proportion of leucocytes. In places the septa have broken down and the adjacent channels have become confluent. The liver cells in the neighbourhood of the blood spaces are much flattened and compressed, and here and there islets of hepatic cells may be seen completely cut off from the liver substance. In places there has been definite extravasation of blood, and the corpuscles are seen lying free between the liver cells. There is a very large deposit of brown pigment in the immediate neighbourhood of the blood spaces, and for some distance from each group of spaces the cells contain an excess of pigment. The tumours appear to be cavernous angeiomata and to have been developed by the dilatation of the existing blood capillaries.

Bladder and *ureters* appear normal.

Uterus rises to the brim of the pelvis. There are some remains of the membranes in it. The cervix is slightly torn.

The post-mortem examination shows that death resulted from a cerebral hæmorrhage, causing extensive destruction of the substance of the pons varolii. But it also affords evidence in accordance with our view that the case was primarily one of eclampsia. The kidney changes were slight, but quite definitely those of degeneration in the shape of fatty change and necrosis, such as is usually found in eclampsia, and the amount of chronic renal disease is too trifling to admit of its being considered the primary factor in the case. Although the changes in the liver were not distinctive of those found in the toxæmia of pregnancy, the post-mortem evidence is on the whole quite consistent with our interpretation of the case.

The further evidence which we would bring forward on this question is, first, the occurrence of a definite pre-eclamptic stage. When the patient was first seen she exhibited the signs of impending eclampsia—sleeplessness, spots before the eyes, headache, with general œdema and highly albuminous urine. That the symptoms came on as early as the fifth month is no valid argument against the disease being eclampsia, for during the last few years there have been three such cases treated in St. Thomas's Hospital in the fifth month of pregnancy, *i.e.*, the case under discussion and two others. Also, according to Clarence Webster [1], one has been observed as early as the fourth month by Willis, and Tarnier, out of fifty-two cases, noticed one at the fifth month. The earliest case we have come across in the literature is one before the fourth month recorded by Pratt [2].

The next point is that, although there is no definite evidence of a fit, there are points in the history very suggestive of their occurrence. There is the husband's statement of his having noticed the hands twitch before he fell asleep; and there is the fact that the patient was found out of bed on the floor. But the absence of fits is no evidence against the case being one of eclampsia, for, as Schmorl [3] says, convulsions are only a symptom of eclampsia, though a most important one, and they do not constitute the disease itself. Many cases have been recorded as eclampsia in which there were no fits. We may give references to a few we have come across. Schmorl [4] records three, including one of Wendt's [5]; Labhart [6], Meyer-Wirz [7], Esch [8], Bouffe de St. Blaise [9], and Binder [10] one each.

Further, the cases of a similar nature we have been able to collect form very important evidence of our case being one of a definite group in which hæmorrhage into the base of the brain is the immediate cause of death in eclampsia. These cases will be quoted later on, and form perhaps the strongest argument in favour of our contention.

Lastly, there is the question of an alternative explanation; it is certainly not easy to understand why a large hæmorrhage of this kind should occur in a previously healthy young woman of 24, without disease of the arteries. Three of the other cases we have collected occurred in young women, so that presumably the poison of eclampsia was the determining cause of the apoplexy in them also.

Assuming, then, on these grounds that the case was one of eclampsia, the next point we wish to consider is the occurrence of cerebral hæmorrhage in eclampsia. The changes in the brain in eclampsia are not definite, but it is very common to find small hæmorrhages, generally meningeal, which are usually ascribed to the rise of blood-pressure due to the fits, and that this is the probable explanation is shown by the fact that they are generally found to be most marked in those cases where there have been a large number of convulsions. These small hæmorrhages are, however, quite different from extensive apoplexies, which are much more rare. A very brief review of the statistics will show this.

In a large number of cases from the Vienna Clinic analysed by Schauta [11], out of ninety post-mortem cases ten cases were noted as showing evidences of cerebral hæmorrhage, and of these in four it was termed "apoplexia gravis" and in the others "apoplexia capillaris." Schreiber [12], in twenty-seven fatal cases, notes no large cerebral apoplexy, though there are four cases of capillary hæmorrhage. Glockner [13], out of twenty-six post-mortem examinations, mentions cerebral hæmorrhage as having occurred in three cases and meningeal hæmorrhage in one, though no details are given as to size. Schmorl [14], as the result of his examination of seventy-three fatal cases, says of the cerebral conditions found: "Out of sixty-five cases, in fifty-eight changes in the brain were noted in the shape of small, seldom large, hæmorrhages with areas of softening." For the most part he looks on these as thrombotic in origin and as secondary to the convulsions.

The cases to which we especially wish to draw attention are those of hæmorrhage into the pons varolii, or base of the brain, as it is such cases which appear to be similar to our own. Occasionally such are found recorded in some of the statistics already quoted, but the details of the illness are not given fully enough to make them of use for our purpose. For instance, in Schauta's paper he records a case of hæmorrhage into the pons preceded by fits, and one of hæmorrhage into the corpus striatum, in which the history was incomplete. The case which appeals most to us in regard to our own experience is one recorded by Pfannenstiel [15] under the title "Apoplexy as the cause of death in Eclampsia." It is of special interest to us as Pfannenstiel was evidently much impressed by his mistake in diagnosis. He says that the case appeared to be one of eclampsia or uræmia, as shown by the deep coma, the absolute insensibility and loss of movements, by the wide inactive pupils and the high albuminosity of the urine. The possibility of apoplexy was not considered because there was no asymmetry of the face or any unilateral signs, though he states that these may have been present before the patient was seen.

His patient was a primipara, aged 22, who was admitted to the clinic, in labour and unconscious, with the diagnosis of eclampsia, at 9 a.m. According to her sister, she had previously been quite well in this, her first pregnancy, but for a few days had had swollen feet and severe pain in the back and side. Some four hours before admission, while lying in bed, she had an attack of sickness and a short fit, after which consciousness had not returned. When seen after admission she was lying on her back with her limbs quite limp; there was œdema up to the knees. The pulse-rate was 68, of medium strength; respirations 44, shallow and rattling. The pupils were widely dilated, equal, and the corneæ insensitive. The fundus was normal, and no change was noted in the small vessels. The face was symmetrical, and the sensibility over the whole body was lost. The urine withdrawn by catheter was barely 80 c. cm. and became solid on boiling, so that the test-tube could be turned upside down; it contained a few casts and some fatty epithelium, but no blood-cells. The fundus uteri was three finger breadths below the xiphoid, and the fœtal heart was heard two finger breadths below the navel. The os admitted two fingers, and the membranes were intact. A kolporeurynteur was placed in the vagina: a hot bath (30° R.) for half an hour was given, and an icebag was placed on the head. At 11 a.m. there was marked tracheal rattling and the pulse was irregular, so 600 c. cm. of blood, very dark in colour, were abstracted from a vein and an equal quantity of normal saline solution injected. After this the pulse improved and the tracheal rattling became less. At noon the condition was again worse, with a small pulse and very shallow breathing; the os was found to be the size of a thaler, so dilatation with the fingers was adopted, followed by rupture of the membranes and version with the bringing down of a leg. Shortly afterwards a male child, well developed and recently dead, was delivered; ten minutes later the placenta was expressed. For a short time after delivery the respirations were deeper and there was no tracheal rattling; the pulse was 96, regular and stronger than before; and there was no bleeding. The pupils remained widely dilated, and there was no corneal reflex. This improvement proved, however, to be very temporary, for the pulse became feebler and the breathing stertorous, and at 3.15 p.m. the patient died.

The post-mortem findings were briefly as follows: In the *kidneys* there was little change to the naked eye; microscopically there was fine granular and cloudy swelling of the epithelium, with here and there necrosis; there were some fine granular coagula in some of the canals. The *liver* showed a map-like pattern with deep red colouring of the parenchyma, both on the surface and on section. Microscopically there were areas of unstained or poorly stained cells; the liver cells were fatty and contained blood pigment. In the *brain* there was complete destruction of the left optic thalamus and surrounding parts by a hæmorrhage which had broken through into the left lateral ventricle, with hæmorrhagic softening of the right optic eminence and filling of all the ventricles with dark blood. There were points of blood in the pons; the arteries were normal, except in the neighbourhood of the hæmorrhage. In the optic eminence was a varix the size of a cherry-stone with fresh thrombosis, and microscopically the position of the bursting of this thin-walled sac was recognised. No varices were noted elsewhere in the body.

In discussing the case Pfannenstiel considers that delivery improved matters for a time by lowering the abdominal pressure and so relieving the blood-pressure. He thinks that the extensive nature of the cerebral hæmorrhage was the reason of the error in diagnosis; it early compressed large areas of both cerebral tracts, and so no one-sided symptoms were noted, but only total paralysis and deep coma. Probably the thin-walled varix in the left optic eminence, which must be regarded as pre-existent, formed a *locus minoris resistentiæ*, and when the blood-pressure was raised in consequence of the first eclamptic attack it gave way. He considers that the case is shown to be one of true eclampsia by the highly albuminous urine, by the presence of œdema and the usual premonitory symptoms, and by the pathological findings in the liver and kidneys. Except that the area of the base of the brain involved in the hæmorrhage is not quite the same, this case is similar to ours, and bears out the interpretation which we have given of it.

The next case which we have come across is one recorded by Meyer-Wirz [16]. The patient was a primipara, aged 38, with a considerable amount of albuminuria. Spontaneous delivery of a living child had taken place at 5 p.m., and the doctor, when called two hours later, found her unconscious, in deep coma and cyanosed, with a pulse of 100 and a temperature of 37·5° C. The pupils were of medium size and equal; respiration was of the Cheyne-Stokes type. The uterus was contracted, and there was no hæmorrhage. Two grammes of chloral were given by the rectum and oil of camphor hypodermically; an icebag was put to the head, and artificial respiration was tried, but the pulse-rate and temperature rose until they reached 160 and 40·6° C. respectively just before the death of the patient. The post-mortem revealed the following condition:—

Brain.—Pia mater œdematous; sub-pial hæmorrhages in the parietal and temporal convolutions of the right side. In the posterior fossa were 30 c.c. of blood-stained fluid. At the base of the brain was a definite sub-pial hæmorrhage, and blood coagula were present on the under surface of the medulla and round the origin of the vagus. The pons was markedly widened and bulged forward. On taking away the brain the surface tore through on the left side, and thick blood flowed out. There were blood coagula in the Sylvian fossa, and the lateral ventricles were dilated and contained blood-stained fluid. There were blood coagula in the corpora quadrigemina. On the right side there was a circumscribed hæmorrhage between the corpora striata, almost in the middle line, and the surrounding tissue was softened. The hæmorrhage involved principally the lenticular nucleus and the internal capsule. The caudate nucleus and the cerebral peduncles were free. In the pons was an extensive hæmorrhage, the aqueduct of Sylvius and fourth ventricle being filled with coagula. There was nothing in the cerebellum.

Kidneys.—The capsule stripped easily; microscopically there was cloudy swelling and some parenchymatous change, but no fatty change.

Liver.—This organ was slightly enlarged, and on its surface were some slight hæmorrhages. On section many punctiform hæmorrhages were seen, and small miliary necrosis all over, especially under the capsule.

The next case is one recorded by Maygrier and Chavane [17]. The patient was a primigravida, aged 25, pregnant 7½ months. When first seen everything was normal, and no trace of albumin was found in the urine. On the following day some difficulty in breathing was noticed, and this rapidly increased. The patient was pale, and there was sharp pain in the epigastrium. Nothing abnormal was found in the lungs or heart. Oxygen was given, and a hypodermic injection of ether. In a few hours vomiting and diarrhœa set in, followed by eclamptic convulsions at short intervals without coma. The urine was then examined and found to be solid with albumin. The convulsions continued, and three hours later the patient was semi-comatose, with a pale skin, but no œdema. The urine was dark, appearing to contain blood, and was solid with albumin. Respiration was normal, and the temperature 36·4° C. Labour had commenced, and the membranes were ruptured; the fœtal heart was heard beating strongly. Chloral, chloroform, and oxygen were administered, and later the patient was bled to the amount of 300 grm. and normal saline infused to a like amount. Rapid dilatation by hand was performed, and a dead child delivered by forceps. During this operation artificial respiration was done, but without relief of the cyanosis, although there was some attempt at respiration. There was considerable post-partum hæmorrhage, so the placenta was removed by hand and an intra-uterine douche given. The patient died suddenly shortly afterwards.

Inquiry afterwards from the friends showed that the woman had come to the hospital about three months previously, when it was found that there was albuminuria, but she then refused admission. The placenta showed six foci of hæmorrhage, but no œdema. A post-mortem examination was made twenty-four hours after death. There was no œdema. There were signs of old tubercle in the lungs. The heart was enlarged and fatty, with pale muscle, and some old disease of the mitral valve.

Liver.—The liver was pale yellow, with red patches of irregular outline beneath the capsule, which extended into the substance of the organ. On section there were numerous red patches resembling blood extravasations. Microscopically there were hæmorrhagic points which in places invaded and destroyed the lobules. The liver cells were much deformed, but still stained. The protoplasm was slightly granular. The condition of the liver was hæmorrhagic rather than degenerative.

Kidneys.—The kidneys were pale, and the capsule stripped easily, but they appeared normal to the naked eye. The only microscopical change of importance was cloudy swelling of the epithelium with granular protoplasm which stained badly.

Brain.—There was a large hæmorrhage in the right hemisphere, destroying a large part of the cerebral peduncle, and extending as far as the anterior wall and posterior limb of the internal capsule, skirting the corpus striatum. The third ventricle was much dilated, and there was a clot the size of a pea in the head of the caudate nucleus. The left ventricle was entirely filled with a large clot, part of the hæmorrhage extending forwards.

Another case of a like nature is recorded by Esch [18], under the title of "Eclampsia without Fits." The following is an abstract of this case: On January 20, 1899, Esch was called to a primigravida, aged 25, who had had pains since 11 p.m. on January 19. Her last period was on April 14, 1898. The history showed that she had passed bloody urine on the evening of the 19th, had had dimness and spots before the eyes, and had been twice sick. There was no abdominal pain, but severe headache; at 9 a.m. on the 20th there was twitching of the face and complete blindness, but the patient was still conscious. When first seen the fundus uteri was between the navel and the sternum, the fœtal heart was audible, and there were slight pains; the os admitted one finger, and the membranes were unruptured. After the amblyopia great excitability came on, but with clear intelligence. At 12 noon the mental acuteness began rapidly to diminish, and this so quickly that by 12.30 the patient had completely lost consciousness. The urine was highly albuminous. The patient was removed to the clinic; nothing happened during removal. On admission at 3 p.m. she was comatose, with deep stertorous breathing and twitching of the face; the pulse was 84 and irregular, the temperature 39·7° C. The pupils were narrow and reactionless. The face was livid, and there was slight œdema of legs; cardiac dulness was not increased, the sounds were clear, and rhonchi were heard over the lungs. Uterine pains were present. The urine was drawn off by catheter at 7.30 and 150 c.c. of dark brown urine obtained; it was acid, specific gravity 1018, and contained a few casts and leucocytes, but no red cells and no bile. The pulse-rate increased and, without the occurrence of any fits, death took place at 11.20.

Post-mortem Report.—Unfortunately the *kidneys* were removed for demonstration purposes, and there is no record of their condition.

Liver.—There were irregular hæmorrhages under the serosa, from the size of a lentil to larger confluent plaques. The organ was clay-coloured on section, and showed many punctiform hæmorrhages. Its structure was ill-defined, and the boundaries of the lobules were not easily recognised.

Brain.—On removal of the skull cap there were punctiform hæmorrhages over the posterior part of the right parietal lobe; on section through the brain further scattered punctiform hæmorrhages were seen. In the posterior part of the right corpus striatum there was a hæmorrhage the size of a hazel-nut, which had destroyed the brain substance; the lateral ventricles, especially the right, were distended with blood-stained fluid.

No doubt other cases might have been found by a more exhaustive search, but our own case and the four others we have quoted are sufficient to support our contention that basal hæmorrhages form a definite complication of eclampsia, and are one of the causes of death in this disease. Further, these cases of "apoplexia gravis" ought to be recognised as a definite group of cases in which the eclamptic poison has chiefly affected the cerebral vessels. No doubt many such go unrecognised, for it is only where a post-mortem examination of the brain is made that their recognition is possible. For instance, one of us has recently seen an eclamptic case presenting many points of resemblance to these cases of death from basal hæmorrhage. A young primipara, a few days after labour, had headache and dimness of vision, with slight twitching, but no definite fit, and shortly became comatose. When seen she exhibited the deep coma and inactive pupils, the cyanosis and the tracheal rattling and stertorous respiration gradually becoming of the Cheyne-Stokes type—the very features which characterise the cases under discussion. The absence of a post-mortem examination makes it impossible to speak definitely of the nature of the case, but it strongly suggested the earlier one, on which this paper is based. This also applies to the case brought before the Glasgow Obstetrical Society by Dr. A. J. Wilson [19], under the title "Apoplexy (?) in a young 2-para." The patient, a woman, aged 22, six months pregnant, went to bed in her usual health, but was observed early in the morning to be unconscious, having vomited dark-coloured fluid like blood; urine was passed involuntarily. There was no œdema or paralysis. The cervix was dilated and the fœtus extracted. Next day there was some return of consciousness, and twitching of the hands and face were noticed. There was suppression of urine and incontinence of fæces. On the evening of the second day the coma deepened, and later paralysis of the left arm and leg was observed, accompanied by Cheyne-Stokes breathing. The urine had been passed involuntarily up to the time of death, which occurred on the fourth day. No post-mortem examination was permitted, and unfortunately, also, there was no examination of the urine. These two cases are mentioned (even though the want of an autopsy renders them unavailable for the present purpose) merely to show that the occurrence of apoplexy in the course of eclampsia may be suspected when the case presents some unusual symptoms.

Indeed, in none of the cases under review was cerebral hæmorrhage recognised before death. It may be worth while, therefore, to note the most characteristic features of these cases. For the most part they occurred in young women (the ages being 24, 22, 38, 25, 25) and all in primigravidæ. This, however, but reflects the great preponderance of eclampsia cases among primiparæ, but the occurrence of cerebral hæmorrhage in women of this age points in a very striking way to the effect of the eclamptic toxins on the arterial walls. In our case pregnancy had only advanced as far as the fifth month, in another case to the eighth month, and in the other three to term; in two of the latter the symptoms began when the patient was in labour, and in one within a few hours of the termination of labour.

After some premonitory symptoms in the shape of headache, ocular disturbance, twitching or respiratory difficulty, the serious nature of the case was generally first shown by the onset of coma, which was sometimes, but not always, preceded by a fit. There was no fit in Meyer-Wirz's case or in Esch's; there was a slight fit in Pfannenstiel's and possibly in our own, and in one only, Maygrier and Chavane's, were there repeated convulsions. Albuminuria was marked in all, and in three cases the urine is described as boiling solid.

The next point is the onset of deep coma, with little in the way of preceding convulsions, and without those occasional movements of the limbs and body which in the ordinary eclamptic comatose patient represent the occurrence of further convulsions. The effect of the damage to the grey matter and afferent and efferent tracts, and the increased intracranial pressure, is shown by the marked respiratory disturbance. The breathing is stertorous, with tracheal rattling, and in the later stages is of the Cheyne-Stokes type. Consequently, cyanosis is a very marked feature in all the cases; in illustration of this attention may be drawn to the frequency with which oxygen was given and artificial respiration tried, and also to the way in which the patient's appearance at once suggested the advisability of bleeding. The pupils are described as inactive, equal in size, and of various degrees of dilatation. Probably the most striking picture would be provided by a case like our own, where the patient, after showing some of the premonitory symptoms of eclampsia, and with little or nothing in the way of convulsions, suddenly becomes deeply comatose and has marked respiratory stertor and Cheyne-Stokes breathing.

The post-mortem findings, except for the large cerebral hæmorrhages, are the same as those usually seen in eclampsia. The kidney changes are described as cloudy swelling and granular degeneration of the renal epithelium, in some cases amounting to necrosis. The liver is described as hæmorrhagic and degenerate, and it is interesting to note that irregular red patches as noted in our case were seen also in Pfannenstiel's and in Maygrier and Chavane's cases. This, however, we did not think had any part in the pathology of our case.

It will be noted that though in the majority of cases there was hæmorrhage into the pons, we have included any case where there was definite damage to the brain substance by hæmorrhage; in fact, we have excluded only the small meningeal hæmorrhages.

In bringing this case before the Section and in commenting on it, we may hope that our error in diagnosis and our experience may be of assistance to the Fellows, and also that, by drawing attention to the occurrence of apoplexy in eclampsia, we may have helped to show that this is but another expression of the damage effected by the poison which is the cause of this disease.

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[2] Pratt, Wm. "Convulsions with something like Missed Abortion," *Lancet*, 1881, ii., p. 498. (A very interesting account of recovery from eclamptic convulsions in a patient four months pregnant. The patient recovered, but the ovum was not expelled for another two months, when a dead fœtus of about four months development was passed.)

[3] Schmorl. "Zur Lehre von der Eklampsie," *Archiv. f. Gynäk.*, Berl., 1902, lxv., p. 519.

[4] *Ibid. Loc. cit.*, p. 506.

[5] Wendt. *Archiv. f. Gynäk.*, 1898, lvi., p. 104; and Schmorl's paper above, p. 506.

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[7] Meyer-Wirz. *Archiv. f. Gynäk.*, 1904, lxxi., p. 24.

[8] Esch. "Eklampsie ohne Anfalle." *Zentralbl. f. Gynäk.*, Leipz., 1906, xxx., p. 295.

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[10] Binder. "Eklampsia ohne Krampfe," *Zentralbl. f. Gynäk.*, 1906, xxx., p. 1017.

[11] Schauta. "Beiträge zur Lehre von der Eclampsia," *Archiv. f. Gynäk.*, 1881, xviii., p. 263.

[12] Schreiber. *Archiv. f. Gynäk.*, 1896, li., p. 335.

[13] Glockner. *Archiv. f. Gynäk.*, 1901, lxiii., p. 166.

[14] Schmorl. *Loc. cit.*, p. 516, and *Zentralbl. f. Gynäk.*, 1901, p. 700.

[15] Pfannenstiel. "Apoplexie als tödlicher Ausgang von Eclampsie," *Zentralbl. f. Gynäk.*, 1897, p. 601.

[16] Meyer-Wirz. *Loc. cit.*, p. 24.

[17] Maygrier et Chavane. "Eclampsie—Mort par hemorrhage bulbaire," *Bull. de la Soc. d'Obstét. de Paris*, 1899, ii., p. 410.

[18] Esch. *Loc. cit.*

[19] Wilson. *Journ. of Obstet. and Gyn. of Brit. Emp.*, Lond., 1906, x., p. 80.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) thanked the authors for their interesting paper. He had not met with a case of hæmorrhage into the pons Varolii in eclampsia, but he could recall two cases of hæmorrhage into the substance of the brain: one observed at a post-mortem examination and the other in which hemiplegia occurred, from which the patient slowly recovered. He thought that apoplexy was a well-known cause of death in eclampsia, and was surprised that the authors had not found more cases recorded, although they did not claim that their paper was exhaustive. In view of the possibility of the occurrence of cerebral hæmorrhage in eclampsia, the intravenous injection of a large quantity of saline fluid would appear to be not unattended with risk.

Dr. MACNAUGHTON-JONES recalled the fact that the "apoplectiform" was one of the old writers' divisions of eclampsia, in which sanguineous and serous effusion occurred into the ventricles. The symptoms were such as described in this case. He dwelt on the importance of early anticipation of the eclampsia, especially through the ocular symptoms and signs which were often present, and in which an ophthalmoscopic examination afforded most valuable evidence of the approaching danger. He instanced cases in which such warning had given indications for treatment, and possibly for rapid delivery. One of the most valuable therapeutical means they possessed to control the increased blood-pressure in these cases of threatening cerebral hæmorrhage he believed to be the employment of weak doses of pilocarpin, which was also useful in checking the convulsions, as first suggested by Procounich. If necessary, its full physiological action might be neutralised by $\frac{1}{100}$ gr. of atropin. These weak doses could be repeated at intervals. As to the earliest date at which he had known eclampsia occur in pregnancy, he had once been summoned to the wife of a medical man who, in the fourth month of her pregnancy, had been seized with convulsions. She had been treated by chloroform before he saw her. Efforts were made to dilate the uterus and empty it, but she died before this could be effected. There was albuminuria.

Mr. A. LIONEL SMITH said he had seen three cases of cerebral hæmorrhage complicating eclampsia or toxæmia of pregnancy, in all of which the diagnosis was confirmed at the necropsy.

Case 1 was a primiparous single woman, aged 23. The labour, which occurred at term, was natural. The urine was loaded with albumin. Ten minutes after delivery the patient had an eclamptic convulsion, and for the following fifteen hours she had intermittent seizures. She was bled, and three and a half pints of normal saline were injected into the median basilic vein. During the injection she suddenly became very deeply cyanosed and comatose, and died shortly afterwards. At the time of death the rectal temperature was 108·2° F. At the necropsy the lateral ventricles were found distended with blood which had escaped from a ruptured vessel in the choroid plexus. The kidneys showed subacute tubal nephritis.

Case 2 was a woman, aged 24, 3-para, six months pregnant. She fell down in the street unconscious, but recovered and walked home. Shortly afterwards she again became unconscious, and for the following week remained semi-comatose and hemiplegic. Labour was induced. During the following nine days the coma gradually became more marked. At the time of death the temperature was 104·6 F°. At the necropsy a large cerebral hæmorrhage was found. The abdominal viscera were practically normal with the exception of the kidneys, which showed chronic tubal nephritis.

Case 3 was a multipara, aged 34, thirty weeks pregnant. She was under treatment for severe vomiting and albuminuria. She suddenly became unconscious and died about an hour later. At the necropsy a pontine hæmorrhage was found. The kidneys showed slight tubal nephritis and great degeneration of the tubal epithelium. The liver was very mottled and showed cloudy swelling and fatty metamorphosis. The spleen was almost diffluent, probably the result of the toxæmia. Mr. Lionel Smith was able to make an extremely rare and interesting observation in this case, namely, the duration of life of the fœtus after the death of the mother. At the time of the patient's death the fœtal heart-rate was 120 per minute; eleven minutes after death, 80 per minute; fourteen minutes after death, 74 per minute; seventeen minutes after death, 62 per minute. It then became irregular, very indistinct and uncountable. Vigorous fœtal movements were felt for as long as twenty-three minutes after the patient's death.

Dr. AMAND ROUTH had not had an opportunity of seeing a post-mortem examination of any case dying of puerperal eclampsia where cerebral hæmorrhage had been found, but thought the authors had shown how often such hæmorrhage might supervene and be the immediate cause of death. He thought it unwise to increase arterial tension as must have been done in the first case reported when 10 oz. of blood were removed and 40 oz. of saline infusion injected. This may well have increased the tendency to hæmorrhage. He presumed that saline infusion in these cases is given to dilute the toxins at each given point and to increase the leucocytosis to combat the toxins, but it was doubtful if it should be given when it increased arterial pressure. On the other hand, he considered that the suggestion to give pilocarpin (at all events in the dose usually prescribed, viz., $\frac{1}{5}$ gr.) was fraught with grave danger. He considered it should never be given in cases where apoplectic symptoms or coma were present, for he had seen patients under its influence suffocated by the enormous quantity of ropy mucus secreted by their salivary and bronchopharyngeal glands. He was interested in the fact that epigastric pain had been mentioned as a precursor of eclampsia in some of these cases of albuminuria of pregnancy. He considered this sign, following ocular evidences of high arterial tension, increasing albuminuria and diminishing excretion of urea, a valuable indication that eclampsia was impending, and that steps should be taken to induce labour without needless delay.

Mr. D. C. RAYNER referred to a case of eclampsia under his care in which a fatal termination was due to cerebral hæmorrhage. The patient, aged 32, was in the eighth month of her third pregnancy. There had been a good deal of œdema of the lower extremities for a month previous to the onset of convulsions, but otherwise the pregnancy had been normal. When first seen by her doctor she was having what appeared to be ordinary eclamptic convulsions about every five minutes. She was sent into the Bristol General Hospital, and when seen shortly after admission she was quite unconscious and the fits were occurring about every four or five minutes; the movements, however, were more marked on the right side, and there appeared to be some partial paralysis of the left arm and leg. Her respirations were 24, breathing stertorous; pulse 100, rather tense; temperature, 101° F. The pupils were very unequal, the right being much dilated and the left somewhat contracted. No reaction to light. The urine, on boiling, contained half albumin. No uterine contractions were present and the os was firmly closed. It was thought she was probably suffering from eclampsia with some grave cerebral lesion, and no active treatment was undertaken. She died in about two hours, the fits becoming less frequent, the deep coma and stertorous breathing more marked. A post-mortem examination was made on the following day, when it was found there was an extensive hæmorrhage into the right corpus striatum and optic thalamus, the latter being ploughed up, the blood bursting into the lateral ventricle and distending it. The kidneys appeared somewhat congested to the naked eye, but were otherwise normal. No microscopic examination was made. The other organs were healthy.

Dr. R. H. HODGSON said that he thought the lesson to be learnt from this instructive paper was, in all cases of eclampsia in pregnant women: empty the uterus. He had done so in six cases he had, and in all the women recovered, five very rapidly and one, in whom some slight convulsions continued for five days, was quite well after one injection of pilocarpin. Emptying the uterus causes the blood to flow to the portal system and thus lessens the danger of cerebral hæmorrhage. He did not understand the object of the saline injection.

Dr. FAIRBAIRN, in reply, said there had been no attempt to make an exhaustive collection of cases of apoplexy as the cause of death in eclampsia, and the cases collected were those of hæmorrhage into the pons or base of the brain without unilateral symptoms to suggest apoplexy. Large cerebral hæmorrhages were not frequent in eclampsia, as was shown by the statistics quoted in the paper from Schauta, Schreiber, Schmorl and others. Dr. Eden's cases seemed to be similar to those mentioned in the paper, and also to the third one quoted by Dr. Lionel Smith, but the first two of Dr. Smith's seemed to be cases of renal disease of some standing, where cerebral hæmorrhage might be expected to occur independently of the occurrence of eclampsia. The cases recorded were undoubtedly rare, but the possibility of a deeply comatose and cyanosed eclamptic patient having also a cerebral hæmorrhage ought not to be lost sight of, especially in giving a prognosis.

Hydrosalpinx with Torsion of the Pedicle.

By J. P. HEDLEY, M.B.

THE patient, E. F., was an unmarried woman, aged 23, who had been under treatment at St. Thomas's Hospital on several occasions for deformities resulting from rickets. Her family history was good, except in the case of one brother, who had died of tuberculosis. Catamenia started when aged 15, and were regular. At the time of the onset of her illness she was under treatment in the Physical Exercise Department at St. Thomas's for lateral curvature of the spine. On November 4, 1907, she was in a tramcar on her way to the hospital when she was seized with very severe abdominal pain in the left hypochondrium; the pain, which was said to be of a gnawing character, shot down into the left groin and was aggravated by jolting. She returned to her home and was treated with poultices to the abdomen; the pain continued all night, and during that time she vomited three times. The next morning she was brought to the hospital still suffering from abdominal pain, and was admitted to a medical ward.

On examination she was found to have some dulness over the left lung from the seventh rib downwards in the axilla, and poorly heard breath sounds over the whole lung; vocal resonance and fremitus were diminished over the dull area; the abdomen presented nothing abnormal except that there was a small area of tenderness at the brim of the pelvis; the urine was normal. The next day (November 6) the pain generally had become less, but once or twice an hour the patient had short paroxysms of severe abdominal pain; these ceased in the course of the day. After two days the only signs found on abdominal examination were two small areas of tenderness on the left side, one at the tip of the twelfth rib, the other in the iliac region. From the time of admission the temperature was irregular, ranging from 99° F. to 101° F., on one occasion reaching 103° F.

On November 9 Dr. Tate was asked to see the patient, and on rectal examination found what appeared to be an inflammatory mass in the left side of the pelvis; the fever continued and the patient's condition remained unchanged. She was transferred to the gynæcological ward, and Dr. Tate decided to operate on November 21.

The abdomen was opened by displacing the rectus muscle, and a tumour the size of a small orange was seen in the left iliac region attached to the uterus and broad ligament by a pedicle ½ in. in length, which was seen to be twice completely twisted in the direction of the hands of a watch. The pedicle was untwisted, transfixed and ligatured and the tumour removed; the left ovary was seen to the outer side of the tumour, quite separate and normal, and was not removed. The right appendages were slightly injected, but otherwise normal. The tumour was found to be a hydrosalpinx, of which the pedicle had become twisted; the cystic swelling was about the size of a small orange. At the uterine end there was a thin tag—the twisted part of the tube; external to this the wall was thickened to about ⅓ in. by recently effused blood; at the external pole the adherent fimbriæ could be distinctly seen. For ¾ in. external to the twist the tube could be seen thickened but not distended; this part was cut across and its lumen was found to admit a probe for a short distance in each direction. From the interior of the hydrosalpinx the wall was seen to be irregular, the lining being thrown into folds, behind which the dark coloration of the effused blood could be seen; the tumour contained 4 oz. of thin blood-stained fluid, which was sterile.

After the operation the temperature still remained irregular, though at a lower level, for a fortnight; nothing, however, could be found to account for this. The wound healed by first intention, the stitches being removed on the seventh day, and the patient left the hospital three and a half weeks after the operation. The signs in the chest at the time of discharge were unchanged.

Bilateral Hæmorrhagic Ovarian Cysts.

By J. P. Hedley, M.B.

The patient, E. A. T., an unmarried woman, aged 44, was admitted to St. Thomas's Hospital under the care of Dr. Tate on December 3, 1907. She had had three attacks of acute rheumatism, the last of which was sixteen years before admission. Catamenia started when aged 17, and were normal until 22, when the patient had profuse loss, lasting for one month, for which she was treated in a country hospital; again, at 25, she had a similar though less severe attack, for which she was not treated; otherwise there was no excessive loss until nine years later, when her periods became profuse and lasted for a week; at the same time she noticed some increase in the size of her abdomen, which she attributed to indigestion; the periods remained profuse, but there was no metrorrhagia.

For some weeks before admission the patient thought that there had been an increase in the size of her abdomen, and for one year she had sometimes had very severe abdominal pain for one or two days before the onset of the periods. There had been some incontinence of urine during the year.

On examination, the patient was a very anæmic woman who had suffered from menorrhagia for ten years with some abdominal enlargement. There was a systolic cardiac murmur heard at the apex; the urine was normal. The abdomen was found to be enlarged, over the lower half the enlargement being more marked in the transverse than the antero-posterior diameter, with definite bulging in the flanks. Rising up out of the pelvis to the level of the umbilicus a semi-solid tumour could be felt, symmetrically placed and not tender. The percussion note over the tumour was impaired, but was normal in the flanks. *Per vaginam* the cervix was found to be rather high up and directed backwards; depressing the anterior vaginal wall was a hard, rounded tumour, which apparently sprang from the anterior part of the uterus; this hard part seemed to be continuous with the cystic portion felt in the abdomen, and also extended outwards to the left side of the pelvis and bulged down the lateral fornix; bimanually the upper limit of it could be felt just above the symphysis pubis.

On December 5 Dr. Tate operated. The abdomen was opened by displacement of the rectus muscle outwards, and two cysts were seen closely adherent to one another, to the rectum and posterior peritoneum behind, and the bladder in front. The adhesions were broken down, the cysts emptied of their viscid, tar-like, fluid contents; the left one was then found to communicate with a cavity in the broad ligament, and the viscid fluid had made its way up behind the posterior peritoneum towards the left kidney; from this pocket 4 oz. or 5 oz. of fluid were evacuated. The body of the uterus was somewhat enlarged by fibroids, and was removed with its appendages, drainage being established through the vagina. The parts removed consisted of the uterus, containing two fibro-myomata and both appendages. The ovaries were both converted into large cysts, presenting externally a dirty white appearance, and containing each about a pint of thick, tar-like fluid; the left cyst measured 5 in. by 4 in., and the right 6 in. by 5 in. In the walls of both were scattered hard, circular areas varying in diameter from ½ in. to 1 in., and of cartilaginous consistency, to the inner surfaces of which old blood-clot was adherent. Externally on the posterior surface of the left cyst, near the uterus, there was an area of about 2 sq. in. in extent, covered with a smooth membrane which had formed part of the lining of the retro-peritoneal pocket. The left Fallopian tube could be seen opening directly into the cyst, but was itself not much dilated, although it contained some of the thick fluid. On the right side near the fimbriated end of the tube there was a rent in the wall of the cyst which made it impossible to be certain whether this tube also communicated with its cyst, but from the positions of the fimbriated end and the rent this appeared probable. The Fallopian tube was dilated to the diameter of 1 in., and contained fluid similar to that in the cysts.

The patient stood the operation well, made good progress and was able to get up after two weeks and five days. For some time there was a considerable discharge of fluid similar to that in the cysts, but this rapidly decreased, though it had not quite ceased by the time the patient was able to get up.

DISCUSSION.

Dr. Mansell Moullin said he had met with two similar cases; the twisting of the pedicle of a hydrosalpinx was not an infrequent occurrence. He showed a specimen removed the same afternoon, in which the twisting had occurred in the middle of the tube, leaving a large hydrosalpinx at the proximal end, to which was attached the blood-filled sac. The symptoms were those usual to twisting of a pedicle, but, in the absence of a large tumour, the diagnosis was generally missed. One could not get beyond the fact that there was acute trouble in a Fallopian tube, and the surmise was usually tubal abortion.

Dr. Lewers said he had operated on a case of pyosalpinx with a twisted pedicle some five years ago, and had shown the specimen at the Obstetrical Society.[1] In that case the patient was undoubtedly a virgin, but she had double pyosalpinx. On one side the pedicle was twisted several times, but on the other side it was not twisted. It was possible to remove the pyosalpinx on each side without removing the corresponding ovary.

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[1] *Trans. Obst. Soc. Lond.* (1903). 1904, xliv., p. 362.

A Twisted Inflamed Fallopian Tube.

Shown by JOHN D. MALCOLM, F.R.C.S.Edin.

MR. MALCOLM showed a specimen removed from a patient, aged 52, the mother of eight children, three of which were alive, the last born eighteen years ago. The woman had been a hospital out-patient for two years, because her periods were profuse and prolonged and associated with an offensive yellow discharge during the intervals. There had been attacks of pelvic pain on three or four occasions, which passed off after a few days. The periods and the yellow discharge ceased in October, 1907, only a slight white discharge remaining. On November 23 the patient was suddenly seized by a severe pain with vomiting and repeated faintness. The abdomen swelled, she could not bear her clothes to touch her, and she was kept in bed nine days. On December 14 she was admitted to the Samaritan Free Hospital. There was then a swelling the size of a very large orange in the left side of the pelvis and firmly fixed there, with a freely mobile uterus pushed over to the right side. On December 26 the swelling was still tender, but seemed about the size of a cricket-ball. A diagnosis of pyosalpinx was made, and the abdomen was opened on December 27, when the diseased parts were much smaller than had been estimated. The mass, which was fixed at the bottom of Douglas's pouch by easily separated adhesions, was brought up and removed. The right appendages were healthy. The specimen shows the part of the Fallopian tube beyond the ovary tightly twisted and fixed thus by adhesions. The inner part of the tube was not adherent, the uterus being thus left free. When fresh the portion beyond the twist was of a deep blue-black colour.

In his excellent and exhaustive paper on this subject the late Dr. Hamilton Bell stated that no case of torsion of a hydrosalpinx had been recorded in a patient aged over 50, so that this woman's age (52) was interesting. If it were remembered how often a distended Fallopian tube became curled and convoluted because of its short mesentery, it was easy to understand, when its distal part was without a mesentery, how an acute torsion might arise if the parts remained free from adhesions.

Uterus Removed by Wertheim's Method for Advanced Carcinoma of the Cervix.

Shown by ARTHUR H. N. LEWERS, M.D.

THE patient, from whom the specimen shown was removed, was a married woman, aged 46. She had had five children, the youngest aged 16, and two miscarriages, the last fourteen years ago. She was admitted into the London Hospital on June 27, 1907. Menstruation had always been regular and painless. She had noticed a dirty-looking, watery vaginal discharge since December, 1906. For some three weeks before admission she had noticed that the discharge was blood-stained, and she had suffered from pain in the lower part of the back and the "bottom of the stomach."

On vaginal examination the os was patulous, and its margin irregular in outline and sharp, especially behind and to the left. The finger passed readily into a large chasm occupying the cervical canal and extending into the lower part of the body of the uterus. The discharge from it was extremely offensive. The ulcer was obviously due to malignant disease. The uterus was very fairly movable. Under an anæsthetic on July 2, 1907, the malignant ulcer was cautiously scraped, thoroughly swabbed with pure tincture of iodine, and packed with gauze, which was removed twenty-four hours later.

Operation, July 4, 1907.—The uterus was removed by Wertheim's method. The ureters were first dissected out. On stripping down the anterior peritoneal flap considerable difficulty was found in separating the bladder from the supravaginal cervix, but there was no definite evidence that this was due to malignant infiltration, and the bladder was eventually freed without injury. The operation was completed in the manner described by Wertheim.

The patient made a very good recovery from the operation; the vaginal gauze drain was removed on the sixth day. There was a gradual rise of temperature from the sixth to the tenth day, culminating on July 14 in a temperature of 104·2° F. Subsequently the temperature rapidly declined and soon became normal. There were no symptoms connected with the bladder or micturition throughout, and the patient left the hospital on August 7, 1907.

Dr. Lewers had examined her subsequently on several occasions, the last time a few days before Christmas, 1907; on that occasion she was quite well, and the scar at the top of the vagina was quite healthy.

Remarks.—Dr. Lewers said that, broadly speaking, cases of carcinoma of the cervix might be, from the clinical point of view, divided into three classes. The first comprised those cases where it was at once obvious on examination that no operation was possible. This group was a large one, but not, in his experience, the largest. The second class consisted of those cases where, owing to the disease being in an apparently early stage, it seemed worth performing vaginal hysterectomy or the supravaginal amputation of the cervix. This group, unfortunately, contained only a very small proportion of all cases. He had given up supravaginal amputation of the cervix in favour of vaginal hysterectomy some years ago in the treatment of the cases in this class. But, as time went on, he found that it occurred to him more and more rarely to meet with cases in which the disease was sufficiently limited to make it desirable to perform vaginal hysterectomy. It was certainly not worth doing in cases where the disease was so advanced as in the specimen shown on this occasion. Nor was vaginal hysterectomy of any use in cases where there was evidence that the disease had extended outside the anatomical limits of the uterus. The third class consisted of cases in which the disease was too advanced for vaginal hysterectomy, but still not so greatly advanced as to place the case in the class of inoperable cases. This third class, in his opinion, comprised the largest proportion of all cases. There was, perhaps, slight thickening in the direction of one or other broad ligament, or in the direction of one or other utero-sacral ligament; or, as in the specimen shown, very extensive excavation of the cervix and lower part of the body of the uterus by malignant ulceration. It was the great merit of Wertheim's method of hysterectomy that it enabled the operator to deal with cases in this third class, which were previously inoperable. He considered that in deciding to perform Wertheim's operation it was necessary to start the operation as an exploratory laparotomy, because only in the course of the operation could it be decided whether the complete removal of the diseased parts was practicable or desirable. The condition of the lymphatic glands should be investigated as soon as the abdomen was opened; if not only the iliac glands, but also the aortic glands, were extensively involved (in a recent case of this kind he had found enlarged glands extending nearly up to the diaphragm) it might be safely concluded that it would be useless to continue the operation. If only the iliac glands were involved it was certainly worth going on with the dissection of the ureters, as in the course of doing so it would be ascertained whether the iliac glands, though enlarged, could be completely removed, or whether the growth had extended through the glands and involved the coats of the large iliac vessels.

The specimen shown was carefully described and microscopically examined by Dr. R. D. Maxwell, Obstetric Registrar at the London Hospital, whose report is appended.

REPORT ON DR. LEWERS'S SPECIMEN.

(*Shown January* 9, 1908.)

By R. D. Maxwell, M.D.

The specimen consists of the uterus and cervix, both Fallopian tubes, and ovaries.

The specimen has been slit vertically along the posterior aspect, opening up the uterine cavity and exposing the ulcerated cervical canal. The uterine wall is thick, and the enlarged cavity shows a small mucous polypus on its anterior wall. The length of uterus and cervix is 10 cm. The tubes present on both sides accessory ostia. The ovarian artery on both sides is greatly in excess of its normal size.

The cervix shows an irregular ulcerated cavity which would accommodate a small walnut. Ulceration has evidently started in the posterior wall of the canal and tracked forwards on both sides, leaving a median ridge of *apparently* normal cervical tissue in the middle line anteriorly. The growth does not extend far beyond the limits of the external os on to the vaginal cervix, while external to the cervix is seen a depending circular flap of vaginal wall considerably shrunken, though at the time of removal it measured over 1 in. in length.

Surrounding the supravaginal cervix a large mass of fatty cellular tissue is seen, into which is entering on each side the ligated uterine artery. Numerous small cervical branches of this artery are seen ramifying over and through this tissue. The cellular tissue, which on removal formed a triangular tent-shaped mass surrounding the cervix, has shrunk very considerably while hardening in formalin, but still projects outwards from the cervix over 1 in. on both sides. The removal of cellular tissue has been a little more free on the left than on the right side, but a considerable amount more of parametric tissue was removed in shreds during the operation, and is not seen in continuity with the rest of the specimen.

Sections have been taken through the specimen at various situations, and the report on these microscopical slides is appended below. Sections taken from the friable tissue of the cancer after curettage, and from the edge of the external os after operation, show numerous branching solid epithelial columns. In one place the normal squamous epithelium of the vaginal portio can be seen gradually passing into the stage of malignant infiltration. There is nowhere seen any glandular arrangement of epithelial cells, and the growth has evidently originated in the squamous epithelium surrounding the external os and grown almost entirely upwards.

Sections taken through the apparently normal anterior column of cervical tissue show normal glandular tissue being invaded by large solid epithelial columns.

The condition of the parametric tissue is, however, that of greatest interest. A section through the parametrium on the right side has passed through a small lymphatic gland about ⅕ in. in length. Careful examination of this gland does not reveal in its periphery any carcinomatous deposit, while the lymphocytes of the gland are in places packed into small areas where rapid proliferation is proceeding. These nodular masses present the characteristic appearances noted by Cleland,[1] and to which he has given the name of "germ-centres." Their presence seems to be due to chronic inflammation in the vicinity of the gland, and is in no way pathognomonic of cancer, as earlier investigators have thought. The lymphocytes have undergone considerable shrinkage in preparation, but there is no evidence whatever of cancerous invasion. The remainder of the section consists of cellular tissue which, with the exception of a considerable round-celled infiltration, shows no evidence of invasion.

Sections of the parametrium on the left side, where removal has been a little more free than on the right side, show cellular tissue and several vessels in section, but no lymphatic glands. There is here, as well as on the right side, considerable round-celled infiltration, but there is no evidence of extension of the carcinoma either in the perivascular lymphatics or elsewhere.

Examination of the sections through both sides of the parametrium would strongly suggest that the disease has been removed wide of its limits.

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[1] Cleland, *Lancet*, 1905, ii., p. 820.

DISCUSSION.

Mr. DOUGLAS DREW criticised the specimen and considered that a sufficient margin of healthy vagina had not been removed around the growth. He had operated on five cases by Wertheim's method, all of which had recovered from the operation, but in two of them recurrence had taken place in the vaginal scar, owing, he thought, to the fact that a margin of only ½ in. of vagina had been removed around the growth. In his later cases he was careful to get a full inch of healthy tissue.

Dr. MAXWELL, in reply to observations made by members on the specimen, stated that, as regards the radical nature of the operation, there could be little doubt that the hysterectomy had been performed wide of the limits of the disease. Careful sections had been made through the periphery of the parametrium shown on both sides attached to the specimen. On the right side a minute lymphatic gland had been cut transversely and showed no epithelial deposit either in its cortical or central portions, while the left parametrium was equally free from invasion. The technique of the operation had been criticised on the ground that an insufficient portion of vaginal wall had been removed, thus failing to segregate the cancer from the wound area during its removal from the abdomen. This appearance was, however, due to detaching the right-angled clamp forceps from the vaginal wall before there was sufficient hardening and fixation of the tissues. Thus, what gave the appearance in the specimen of a thin collar of vaginal wall barely ½ in. in length was at the time of operation 1½ in. in length and readily met below the cancer growth, thus conforming in every detail to the technique described by Wertheim.

The PRESIDENT (Dr. Herbert Spencer) said that he agreed that the case was one for which Wertheim's operation was indicated. Such a case could not be removed satisfactorily by the vagina. The amount of vagina attached to the specimen was not great, but, as it permitted the clamping of the vagina with forceps below the growth, and had probably shrunk since removal, he thought it was sufficient. The removal of a great length of the vagina was not indicated by what was known of the spread of cancer in such a case as the one exhibited, and it had the serious drawback that it prevented coïtus. He thought there was some advantage in cutting through the vagina below the forceps with the galvano-cautery.

Mr. HAROLD S. SINGTON (introduced by Dr. Handfield Jones) showed a specimen of *Tumour of Fœtal Head.*

Obstetrical and Gynæcological Section.

February 13, 1908.

Dr. Herbert Spencer, President of the Section, in the Chair.

Ovarian Dermoid with Secondary Cysts connected with the Omentum.

By Martin Randall, M.D.

(Introduced by Dr. Herbert Spencer.)

WITH PATHOLOGICAL REPORT AND REMARKS.

By T. W. P. Lawrence, F.R.C.S.

B. B., aged 26, married five years, was seen in consultation on March 29, 1905. She was confined at term on March 2, and had been in bed since with abdominal pain, fever and, latterly, an offensive brown discharge. There was no history of a rigor. The confinement was normal.

Previous History.—Menstruation began at 17, and was very irregular for two years, but was regular afterwards till marriage. There was no special pain or discomfort at the periods. In March, 1904, she was ill for three weeks in bed, with fever and pain in the right iliac region. The illness was thought to be appendicitis, but neither externally nor *per vaginam* could any lump be made out. During her pregnancy she suffered greatly from pains in the back. At the first confinement in December, 1901, a living child was born normally. There was a miscarriage in 1902 at the third month. The second confinement occurred in May, 1903, at term, and likewise resulted in the birth of a living child. In November, 1903, the patient miscarried at the sixth week. The third confinement was at term on March 2, 1905. The child died suddenly in August of that year; a post-mortem examination was made.

and in one ovary was a cyst of the size of a filbert. No hair was seen in it, and it was, unfortunately, thrown away.

Present State.—March 29, 1905: temperature, 102° F.; pulse, 120. Patient was very pale and much wasted. On abdominal examination there was no distension; the abdomen moved well. Considerable tenderness existed above the pubes. No tumour was felt. The os was widely open; there was an offensive brown discharge. The uterus was considerably larger than natural, and was movable. On the right side was a swelling, somewhat fixed, in the region of the broad ligament, about as big as a hen's egg; it was tender. On March 29 the uterus was curetted and one or two small lumps of placental tissue and clot were removed. The largest mass was of the size of a hazel-nut. The discharge soon ceased, but the temperature still rose at night to 101° F. or 102° F., and the mass on the right of the uterus increased in size until, on April 11, it was quite fixed and as large as a goose's egg. It was thought to be a parametric abscess.

First Operation.—On April 14 the swelling was explored under ether. It seemed to be too high to be reached *per vaginam*, so an incision was made a little internal to the anterior superior spine of the ilium on the right side. The mass was reached and a sinus-forceps thrust in. No pus came out, but a little white vernix-like material was seen. It was then thought it might be a dermoid or the sac of a dead extra-uterine gestation, and it was explored from the middle line. It was densely adherent to the lateral pelvic wall, and in view of the patient's weak state and the probability of its containing virulent pus, removal was thought to be too risky. The great omentum was not adherent to the mass. The abdominal wound was closed in layers, and a further attack made from the groin, with the result of evacuating many ounces of fluid which looked like ordinary pus. A drainage-tube was inserted into the cavity from the groin. After about four days some hair was discharged from the wound and some epithelial débris and cholesterin, this making clear the nature of the case.

The patient went out on June 1 fairly well, but with the sinus in the groin still open and discharging some pus. Her temperature had been normal for a fortnight. She was readmitted August 15, 1905. The sinus in the groin was discharging a considerable amount of pus, and a probe was introduced for 4 in. The fixed sac could be felt, with the probe in it, in the right lateral pelvic region, *per vaginam*. The general condition was good, the temperature usually rose at night to 99½° F. The sinus was dressed twice daily and syringed out with boracic lotion, and, on the day before the operation, with biniodide lotion (1 in 5,000). At this date, August 21, there was very little discharge. There were no adhesions to the anterior abdominal wall. The great omentum was firmly adherent to the cyst, and along the broad ligament to the uterus. The omentum was torn through to explore the cyst, which was generally adherent and of about the size of a hen's egg. It was shut off by gauze packing and removed, leaving the part where the sinus was till last. The sinus was then disinfected by pure carbolic acid.

On inspecting the omentum, with a view to removing any ragged pieces, it was seen to contain some whitish nodules, and where it had been adherent to the cyst it had scattered over it many hairs, which appeared to be growing from it. The nodules were firm to the touch, smooth, and varied in size from a mustard-seed to a big pea. They seemed to be situated between the layers of the omentum. One was taken hold of with a view to enucleating it, and gave way ; cheesy whitish material exuded, and on the internal surface were some small fine hairs. After carefully wiping away this débris a large piece of omentum was removed and one or two smaller pieces. The last portion was adherent to the front of the uterus, and when it was separated left a tuft of hair on the front of that organ. The tuft was held between finger and thumb and, with some peritoneum and uterine tissue, snipped away with scissors. Some oozing occurred, necessitating drainage. The left ovary and appendages were examined and found normal. No more cysts or hairs being visible, the abdomen was closed except for the drain aperture.

The operation was rather long, but was well borne. A silk suture gave some trouble, causing a rise of temperature for two days at the end of a fortnight, with some suppuration in the abdominal wound. Otherwise convalescence was satisfactory and the patient left the hospital with the wounds soundly healed on September 28, 1905.

The patient remained quite well for several months, and, on examination about six months after the operation, nothing abnormal could be detected. At the beginning of September, 1906, she complained of neuralgia in the head and vomiting, had an attack of right-sided hemiplegia and died two days afterwards. Unfortunately a post-mortem examination could not be obtained. The abdomen was examined carefully during this illness and nothing abnormal could be found.

Remarks.—Cases of this kind are unusual and very interesting. Mr. Lawrence's report shows two perforations, which I think can only be explained by accidental perforation, either when the cyst was opened or when it was probed subsequently. The appearance of the fluid evacuated was that of pus, but might possibly have been only liquid sebaceous material, although the appearance of the mass and the fall of temperature after evacuation of the contents and the history of the case were more in favour of the view that pus was present. Against this view, however, is the fact that septic peritonitis did not result from the perforation, however produced. It is interesting to note that, as far as could be observed, there were no secondary cysts connected with any other part of the peritoneum except the omentum.

PATHOLOGICAL REPORT AND NOTES OF PREVIOUS CASES, WITH REMARKS.

By T. W. P. Lawrence.

The specimen, comprising a dermoid cyst and a portion of the great omentum, is preserved in the museum of University College Hospital Medical School.

Dermoid Cyst.—The cyst is ovoidal in shape and measures 5·5 cm. by 4 cm. Its inner surface, which has the appearance of skin, is mostly smooth and devoid of hairs, but at one spot it is mammillated, and a number of short scattered hairs spring from it in this situation. The cyst contained sebaceous matter and a loose tuft of brown hairs. The thickness of the cyst wall varies in different places; in most parts it is from 2 mm. to 4 mm.; in one or two places it is less and the cyst wall translucent, whilst at one spot it is as much as 7 mm. Attached to one extremity of the cyst is a flattened ligamentous band, having one of its borders rounded and free; this band is evidently part of the ovarian ligament. Continuous with the cut edge of the ovarian ligament there is an irregular, elongated area on the cyst, marking its border of attachment. The outer surface of the cyst is covered for more than half its extent by a layer of adherent omentum, the rest of the surface, except in one small area, being covered with membranous adhesions. The cyst presents two perforations on that aspect of it which is opposite to the line of attachment. One of the perforations is 1·5 cm. from the point of attachment of the ovarian ligament; it measures 5 mm. in length, and has the form of a fissure, the sides of which are in contact with each other. The cyst wall at this spot has a thickness of 5 mm. Externally the margins of the fissure are somewhat everted, and a few hairs spring from them. The surface of the cyst around the opening is covered with adherent omentum, and a small tuft of hair is entangled in the adhesions close to the perforation. The second perforation is about 2 cm. distant from the opposite extremity of the dermoid, and is situated in a part of the cyst wall having a thickness of nearly 3 mm. Externally it has the form of V-shaped laceration, each limb of the V measuring 5 mm. in length; on the internal surface of the cyst it has a less regular form and is somewhat more extensive. The laceration is closed by a very delicate translucent membrane. Covering the perforation on the internal surface of the cyst is a tuft of hairs, and in and around it on the external surface are a number of bent and twisted hairs, which are entangled in the omentum adherent around the spot. By dragging on the hairs the continuity of those within and those without the cyst can be demonstrated. Embedded in the omentum which adheres to the dermoid there is, at one spot, a flattened cyst of circular outline and pinkish colour, having a diameter of 1 cm. The cyst has very thin walls and contained sebaceous matter in which two short hairs were found. The cavity of the cyst does not communicate with that of the main cyst.

Omentum.—The piece of omentum measures 20 cm. by 13 cm.; it has a normal appearance except for the presence of delicate membranous adhesions covering its surface in places and some matting together of its substance in parts. A number of scattered brown hairs are entangled in those parts which are matted together. At numerous points on both aspects of the omentum small round bodies are present, which could, in the fresh state, be distinguished from the lobules of fat by their greater opacity and their white or, in the case of the larger of them, slightly pink colour. Fifty of these structures were counted, with the aid of a lens, on the two surfaces of the piece of omentum, and many more became visible on microscopic examination. Only a few, however, are large enough to be visible to the naked eye, one, considerably larger than the rest, measuring 5 mm. in diameter; the smaller were more readily distinguished by holding the omentum against a strong light, when, owing to their opacity, they appeared as dark points. These structures are covered by a very delicate layer of membranous adhesion, which binds them to the surface of the omentum; some of the larger ones are partly embedded among the lobules of omental fat. Structurally these bodies are thin-walled cysts, filled with sebaceous material.

Microscopic examination shows that the walls of the larger cysts (for instance, those of 3 mm. or 4 mm. in diameter) are composed of an inner

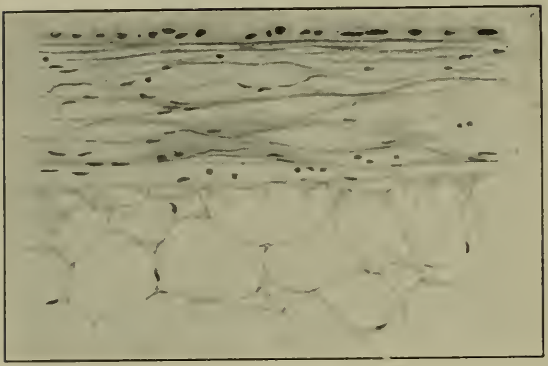

Fig. 1.

A section of the wall of one of the larger implantation cysts, showing internally a single layer of epithelial cells and externally a fibrous stratum in contact with the omental fat.

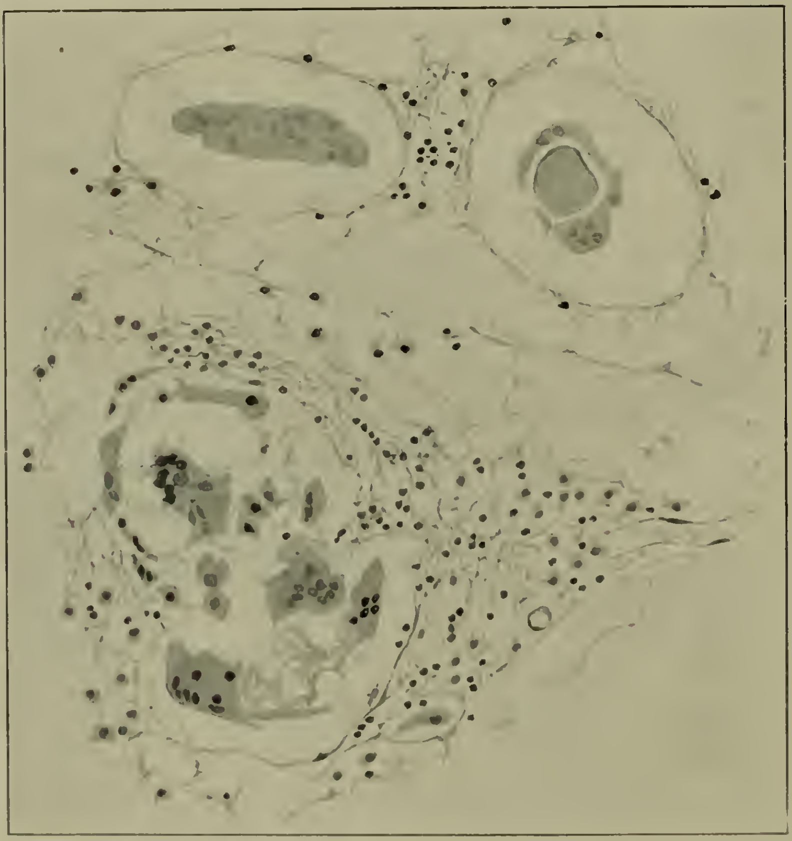

Fig. 2.

A section of the omentum, including three masses of implanted epithelium. The nuclei of all the cells in the two smaller masses and of most of the centrally situated cells of the larger mass show defective staining. Of the smaller masses one is solid and the other contains a central collection of sebaceous material. In the larger mass the cells and sebaceous material were irregularly intermixed, and the protoplasm of some of the cells was finely vacuolated, as in the cells of sebaceous glands.

epithelial and an outer fibrous layer (fig. 1). The fibrous layer consists of a somewhat loose network of white fibres, which mainly run parallel with the inner surface of the cyst; cellular elements are present in small numbers only. The epithelial lining is in most parts formed of a single layer of low cubical epithelium, the cells having a granular protoplasm and round, well-staining nuclei. The arrangement of the epithelium is, however, irregular; in some parts there may be a double layer of cells, in others the cells may be heaped into small aggregates, in others again they may be compressed almost to obliteration, so that the sebaceous material appears to lie in contact with the fibrous stratum. In addition to these fully formed cystic structures, small solid collections of epithelial cells are met with in considerable numbers (fig. 2). They consist of groups of closely packed epithelial cells, varying in number from two or three up to fifteen or twenty cells, lying in the unaltered omental tissue, without any surrounding fibrous wall, and with little or no cellular infiltration around them. The nuclei of these cells stain badly, and the cells themselves are probably dead or dying; in some cases, however, a central space in their midst containing a drop of sebaceous matter gives evidence of their former activity. Intermediate between these solid collections of cells and the cystic structures above described, irregular aggregates of cells are found, in which the process of cyst formation is seen in an early stage. In these the epithelial cells are irregularly intermixed with sebaceous matter, and whilst the peripheral cells present well-staining nuclei, those in the central parts of the mass show evidences of loss of vitality. A distinct fibrous layer is absent, and in place of it the epithelial cells are surrounded by a very delicate fibrillated tissue containing an abundance of lymphocytes.

CASES PREVIOUSLY RECORDED.

Barth's Case.—Two small masses of fatty material were found attached to the liver in a woman, aged 40. One of these, which was of a yellow colour and encysted, was attached to the anterior part of the liver outside the capsule of Glisson; the other, which was similar in character, was situated somewhat higher up. Barth refers the origin of these masses to an old extra-uterine gestation, in connection with which fatty material of a similar kind was present. Lebert examined this specimen, but makes no mention of an extra-uterine gestation. On the other hand he states that the woman had a cyst in the lower part of the abdomen, in the ovary, in which were fatty matter and hair.

Moore's Case.—The patient was a married woman, aged 28. An abdominal tumour was first noticed when aged 18; at the age of 25, three years before the operation, the patient gave birth to a full-term child. One month before the operation pain and swelling occurred at the navel, and nine days before the operation an abscess opened at the navel, leaving a sinus communicating with the cyst. The operation consisted in enlarging the sinus and removing the contents of the cyst as far as possible. The patient died on the ninth day. The dermoid was connected with the left ovary and was of large size (7 lb. of putty-like material were removed at the operation). Extensive old peritoneal adhesions of the abdominal and pelvic viscera were present, the cyst itself being surrounded at almost all parts by tough adhesions. There was suppurative peritonitis in isolated loculi between the cyst and the abdominal parietes. Numerous secondary cysts, mostly of small size, were present in the adhesions in the pelvis, mesentery, omentum and among the coils of intestine; in the last-named situation some of the cysts were of larger size (nutmeg, walnut, nearly as large as a hen's egg). Some were attached by a slender pedicle to the main cyst; others were unconnected with the latter. Their contents consisted of soft, cheesy, yellow epithelium mixed with hairs.

Hulke's Case.—In a patient who died of carcinoma of the uterus all the pelvic viscera were found matted together. There was also a large compound proliferous dermoid cyst full of hair, mingled with a mortar-like mass of disintegrated epidermis, surrounded by several minor cysts of the same kind connected with the uterine appendages; and several similar cysts, in a withered condition, were attached to the surface of the liver, some of them sessile, others hanging by a peritoneal investment.

Kolaczek's Case.—The patient, aged 45, had noticed enlargement of the abdomen seven years previously. An ovarian dermoid, nearly as large as a man's hand, was removed by operation. The dermoid was thick-walled and had in its centre a cavity of the size of the fist, containing sebaceous matter and hair; its surface was smooth. A considerable quantity of serous fluid came away from the peritoneal cavity at the time of the operation, and it was noticed that numerous pale yellow nodules, like miliary tubercles, were present on the parietal and visceral layers of the peritoneum. The nodules were surrounded by a zone of congestion, and varied from the size of a lentil downwards. In many of the nodules a fine hair, in some cases as long as 1 cm., was present and projected freely into the peritoneal cavity. There were no nodules on the surface of the primary dermoid.

Fraenkel's First Case.—Patient aged 37. For eight years menstruation had been profuse. Five years previously the patient had a fall, which was followed by abortion at the fourth month of pregnancy. Two years previously there had been an attack of retention of urine, at which time a tumour of the size of an apple was detected above the right Poupart's ligament. The tumour slowly enlarged and at the same time encroached on the left side. Nine months previously the patient fell on her back from a cart and kept her bed for three weeks with severe pain in the abdomen and sacrum, accompanied at first with fever. At the operation 5 litres of yellowish green fluid, containing fat and cholesterin and a mass of tangled hair and sebaceous matter, were found in the peritoneal cavity. The cyst gave way during its removal and some of the contents entered the peritoneal cavity. The collapsed cyst was removed with great difficulty owing to extensive adhesions and to its being partly intraligamentous. Death occurred from suppurative peritonitis. The cyst, which had arisen in connection with the left ovary, was, in its collapsed state, about twice the size of a placenta; it was covered with a thick, leathery, fibrous layer, except at its lower intraligamentous part. A broad omental band, 10 cm. long and 4 cm. wide, was attached to its upper end. The peritoneum generally was thickened, in places almost warty, or covered with fibrous pseudomembranes. Scattered over the entire peritoneal surface were sessile and pedunculated cysts, varying from the size of a hemp seed to that of a pigeon's egg; these cysts had a smooth outer fibrous coat and a thinner inner coat and contained firm fatty material like lard. The larger tumours were embedded in pseudo-membranes on the liver, diaphragm and transverse meso-colon. Several small pedunculated cystic structures containing sebaceous matter adhered to the outer surface of the ovarian dermoid. At the upper part of the omentum was a cyst of the size of a hazel nut, lined with a firm cutis-like membrane beset with fine hairs and containing sebaceous matter and hairs. In connection with the upper end of the omental band above referred to was a nearly circular mass of the size of the palm of the hand, from the surface of which numerous hairs projected. On section this mass was found to contain an accumulation of tangled hairs cemented together by sebaceous material. Scattered hairs were also attached to the outer surface of the ovarian dermoid. In various parts of the peritoneal and pelvic cavities free masses of suet-like material were found. Microscopically, the wall of the cyst found at the upper part of the omentum consisted of vascular connective tissue in which numerous hairs were embedded, showing very small, ill-developed follicles. The epithelial cells lining the cyst were laterally compressed, elongated and had abundant protoplasm and well-defined nuclei.

Fraenkel's Second Case.—Patient aged 41. An abdominal tumour was first noticed fifteen years before the operation. A dermoid cyst of the right ovary was removed by operation, and during the separation of the very extensive adhesions the intestine was ruptured. Death resulted from acute peritonitis. On the upper surface of the left ovary there was a bean-sized cyst with very thin walls and thick, brownish yellow, honey-like contents. A similar tumour of the size of a hazel nut was attached to the hinder surface of the left broad ligament and another of similar dimensions, having porridge-like contents, was present in the pouch of Douglas. Four or five cysts, varying from the size of a pea to that of a bean, were attached to the anterior surface of the broad ligament and numerous cysts of smaller size, some sessile, some pedunculated, were present in the pelvic peritoneum. Large numbers of similar growths, mostly stalked, and of the size of hemp seeds, were situated on the peritoneal covering of the lower part of the ileum and on the colon.

Grawitz's Case.—The patient was a widow, aged 40, who died from nephritis. Four months previously she had been operated on for strangulated hernia, and the presence of an abdominal tumour was recognised at that time. The abdominal organs were found matted together by old, firm, fibrous adhesions. There was a cyst of the right ovary of the size of a child's head, containing fatty substance and hairs. The left ovary was firmly fixed by adhesions in the pouch of Douglas; it was enlarged into a cyst of the size of an apple and contained fatty matter and hair, and its inner surface bore hairs and three ill-developed teeth. Between the liver and the diaphragm, which were closely adherent, was a flattened cyst, 4 cm. to 5 cm. by 1 cm. to 2 cm., containing white fatty material. Near this was another cyst of the size of a cherry, containing suet-like substance. The inner surfaces of these cysts were smooth and greyish pink or greyish in colour. On cutting through the liver and diaphragm other cysts of similar character were found, varying from the size of a lentil to that of a bean. Connected with the coils of intestine there was a firm, fatty mass, of the size of a goose's egg, surrounded by tough, fibrous adhesions. On section this mass appeared to be divided into compartments, and several globular, smooth-walled cysts were embedded in the fatty tissue. The contents of the cyst were white, glistening, somewhat like mother-of-pearl, and distinguishable from the surrounding fat by firmer consistence. In the neighbourhood of these cysts smaller cysts were present, many of them of minute size and having the characters above described. Microscopically the peritoneal cysts were found to differ in structure from true dermoids. Their walls consisted of fibrillated connective tissue and had not the structure of skin, being devoid of epithelium.

Strassmann's Case.—The patient was aged 58. On performing laparotomy it was found to be impossible to remove a retroperitoneal dermoid completely. The growth was therefore ligatured and an iodoform gauze plug inserted. Death occurred in thirteen days from hypostatic pneumonia. Markedly vascularised, shaggy thickenings, varying in size from a hemp seed to a cherry, were present on the surface of the liver, spleen and intestines. These contained fatty material, and were apparently implantations from a previous rupture of the dermoid.

REMARKS.

The points of practical interest in these cases have reference to the cause of the rupture, the consequences as affecting the peritoneum, and fate of the implantation growths.

As regards the cause of rupture, the present case illustrates definite puncture of the cyst wall. The remaining cases appear to be examples of spontaneous rupture, and perhaps the most noteworthy fact, from the point of view of their etiology, is the absence of any history of injury such as would account for the rupture, or of illness indicating the occurrence of rupture. This remark applies to all the cases except that of Fraenkel (first case), in which a fall on the back, followed by fever and severe abdominal pain, occurred nine months before the removal of the cyst and was probably the direct cause of the rupture. In this case the cys was large (twice the size of a placenta) ; in four of the other cases the cysts were also of large size, whilst in the remaining three cases the size is not mentioned. The descriptions afford no means of judging of the possible relation of pregnancy and labour to rupture of the cyst wall.

With regard to the results of rupture as affecting the peritoneum, two classes of cases have to be distinguished : (1) Where there has been merely a leakage of the contents of the cyst, and (2) where the contents have entered the peritoneal cavity in bulk. In the former class of cases, exemplified by the present specimen, scattered hairs and living epithelial cells become widely distributed over the surface of the peritoneum and fixed by delicate adhesions, whilst a fold of omentum or pseudo-membrane closes the aperture in the dermoid. From the epithelial cells small cysts develop in great numbers and either remain sessile or delicate fibrous pedicles are produced, by which they are attached to the peritoneal surface. The primary dermoid becomes extensively adherent, but the peritoneal adhesions in other situations are mostly slight, often consisting merely of delicate membranes covering the secondary cysts and causing no adhesion between contiguous structures. The second class of cases, in which the contents of the dermoid are expelled in quantity, is illustrated by Fraenkel's first case, in which there was a mass of matted omentum of the size of the palm of the hand, containing in its centre a quantity of closely packed and tangled hair, intermixed with sebaceous material. In such cases, in addition to the secondary cysts and scattered hairs before mentioned, there may be dense adhesions, bands and thickenings in almost any part of the peritoneum. This class of case is therefore of greater gravity than the previous one, and probably would include all cases in which a large cyst had ruptured as a result of considerable violence.

The primary dermoid was found to be extensively adherent in all cases except that of Kolaczek, in which the surface of the cyst is stated to have been smooth, and no mention of adhesions is made.

In none of the cases was rupture of the cyst directly followed by suppuration in the peritoneal cavity.

As regards the fate of the implantation growths, it is to be remarked that not all the living epithelial cells which are distributed over the peritoneum survive. Scattered groups of devitalised cells, which have neither proliferated nor secreted sebaceous matter, are to be found in abundance in the present specimen. When the cells survive, and are of the kind capable of secreting sebaceous matter, a minute and gradually enlarging cyst results, around which a delicate adventitious membrane develops. The growth of the cyst is not, however, indefinite, and it becomes arrested before any considerable size is attained. The great majority of the cysts remain minute, and it is rare for them to reach the size of a walnut. The arrest of growth is caused by necrosis of the lining epithelium, produced, one may suppose, by pressure of the gradually increasing contents of the cysts, combined with defective nutrition of the cells through the medium of the adventitious capsule. The ultimate product is therefore merely a small, encysted mass of sebaceous material. Differences in the size of the cysts are probably related to differences in the size of the implanted masses rather than to variations in the degree of epithelial proliferation, which, in every instance, appears to be slight.

It is the sebaceous cells only, not the lining cells of the cyst, which give rise to implantation cysts; and the absence of secondary cysts in cases of ruptured dermoids may, perhaps, be sufficiently explained, in some instances, by supposing the rent to have occurred in a part of the cyst wall that is devoid of sebaceous glands. It can hardly be doubted, however, that the vitality of the implanted cells and the power of the peritoneum to deal with them vary in different cases, and that these variations would in themselves be sufficient to modify the result.

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DISCUSSION

The PRESIDENT (Dr. Herbert Spencer) thanked the authors for their valuable and interesting paper. He thought there was little doubt that the fluid at the first operation was sebaceous and not purulent. He had been surprised to find how frequently some operators met with "suppurating" dermoids. The explanation, he thought, was that the sebaceous material, fluid at the temperature of the body, closely resembled pus to the naked eye, although it solidified at a lower temperature. In his experience, suppuration rarely occurred in dermoids. A practical deduction from the paper was the importance of removing these and other ovarian tumours entire if they were not very large. This had been his practice for many years. He did not go so far as Mr. Bland-Sutton, who removed all tumours, however large, entire, sometimes making an incision extending from the ensiform cartilage to the fundus: such a long incision certainly to some extent increased the risk of omental and intestinal adhesions and of hernia.

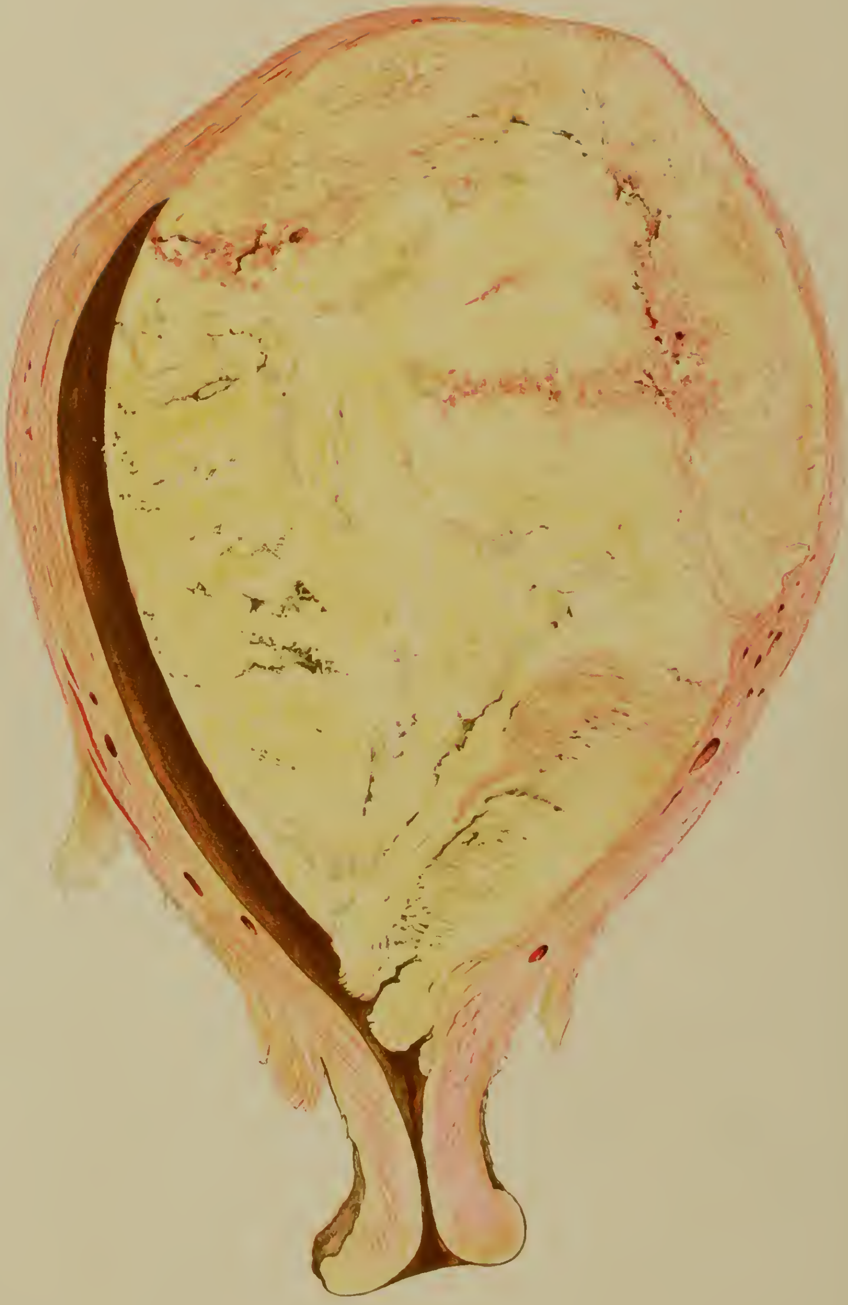
Dr. GALABIN said that he had met with one somewhat similar case, in which there had been a further development of the metastases than in any of those collected by Dr. Randall. An unmarried lady, aged between 40 and 50, came with a large tumour, the history of the duration of which was quite indefinite. She said that her abdomen had been large as long as she could remember, and that her companions at school had chaffed her about it and accused her of being pregnant. An ovarian tumour was diagnosed. At the operation it turned out to be a dermoid and was removed with difficulty on account of universal adhesions. Among the adhesions and over the peritoneum were scattered very numerous thin-walled cysts containing sebaceous fluid like that in the main cyst. These existed also in the cellular tissue of the abdominal wall and pelvis, so that a number of them were divided in the abdominal incision. No skin-like structure was seen in the secondary cysts. Those on the peritoneum were thin-walled, but in the cellular tissue no definite cyst wall could be detected. A good deal of sebaceous material had to be left unremoved, but the incision healed well in the first instance. After some weeks, however, it broke down again, and a discharge of oily fluid began, which later became semi-purulent. The patient remained ill many months, and it was feared that the condition might run a malignant course, but eventually the sinus closed; she recovered completely and was well after several years. He agreed with the President that it was desirable if possible to remove a dermoid cyst of small or moderate size untapped and unruptured. For the distinguishing of the fluid from a dermoid cyst from pus a simple test usually sufficed, since, on cooling, the former became solid and no longer resembled pus.

Dr. R. H. HODGSON suggested that some of the cases alluded to might possibly have been saved had urotropine been used. He had experimented with it in large and small quantities in many and varied diseases: cystitis, peritonitis, pneumonia, &c., and had found it most valuable in septic diseases; but it needed to be used with great caution, as it appeared to search out all the idiosyncrasies of patients more than any other drug with which he was acquainted. The kidneys afforded the first and most marked signs that the drug was in excess. He strongly suggested its use to those who had much operative work on the peritoneum.

Dr. AMAND ROUTH had several cases where dermoid cysts of the ovary had ruptured before or during the operation without such sequelæ as the authors described. Were the authors able to discriminate between dermoids which were innocent and those whose cells were liable to be transplanted, and to develop into proliferating cysts as in the cases recorded by them?

Dr. MACNAUGHTON JONES said there must have been some thousands of ruptured dermoid cysts, and yet but the cases mentioned had been recorded. It did not appear, therefore, that there was a great danger of metastasis or implantation in the instance of simple dermoids. No matter how extensive an incision in some cases of dermoid, and with every care, rupture would occur.

PROC. ROY. SOC. MED.
Obstetrical and Gynæcological Section.
Vol. I. No. 5.



Right half of the uterus in sagittal section (natural size), showing the caseating growth. The lower part of the growth has been broken by the curette.

SPENCER: *Caseating Carcinoma of the Corpus Uteri.*

Bale & Danielsson, Ltd. Lith.

Caseating Carcinoma of the Corpus Uteri.

Shown by HERBERT R. SPENCER, M.D.

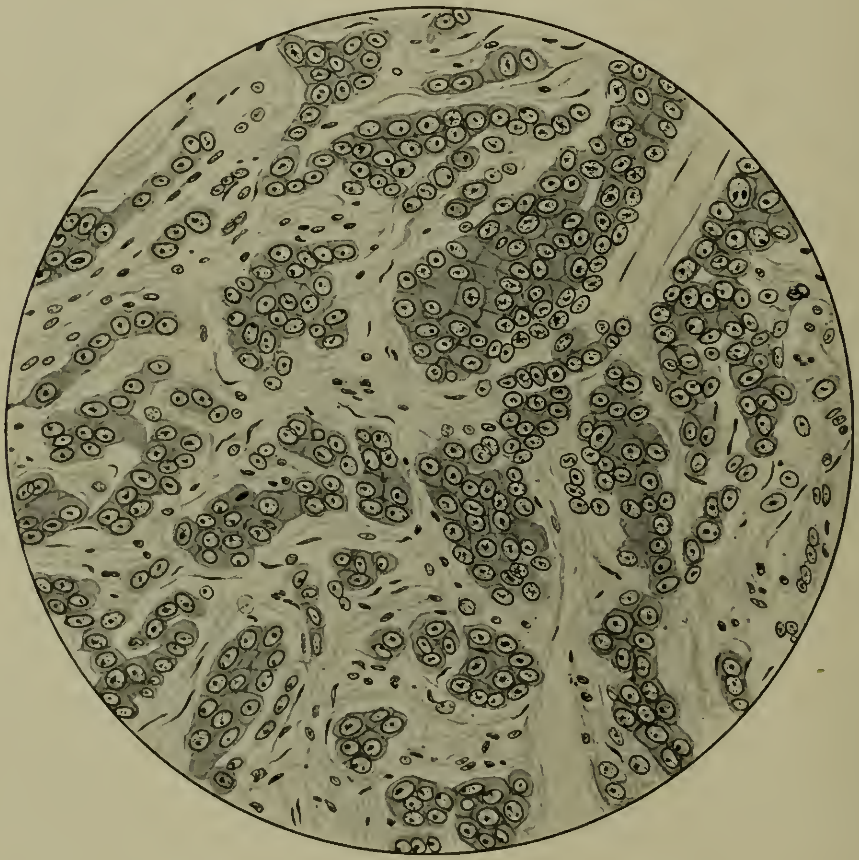
THE specimen consists of a uterus (weighing 1 lb. 1½ oz. and measuring 5¼ in. by 4 in. by 3½ in.), removed by vagino-abdominal hysterectomy for carcimona of the body. The specimen has been injected with carmine and shows a very large growth occupying the whole of the posterior wall and the fundus of the uterus, the anterior wall being unaffected and measuring $\frac{3}{16}$ in. in thickness (*see* Plate). At the upper and back part of the body the growth has penetrated the uterus nearly to the peritoneum and has caused some unevenness of the surface. The peculiar feature of the growth is that the bulk of the tumour—all except its deeper growing part—is converted into a cheesy mass of a yellow white colour, quite smooth on the surface, moulded to the smooth lining of the anterior wall.

On microscopic section this caseated material stains badly, showing only the nuclei, the rest of the tissue not taking the stain. A microscopic section of the more recent growth, obtained by cutting out of the uterus a wedge with its base at the peritoneal surface, shows that the growth is a carcinoma, consisting of closely set columns and masses of epithelial cells with oval nuclei (*see* fig.). The columns are for the most part narrow, not more than two or three cells thick, and have no lumen. The masses also are solid and generally small, but in one place an extensive mass is seen. The stroma is slight in amount and has numerous capillaries and but few leucocytes. The Fallopian tubes are senile; the ovaries are small and contain a few corpora fibrosa.

This uterus is the largest I have removed for cancer of the body, and the only one in which the growth was caseated. I have seen one other case, which was under the care of Sir John Williams. In that case the uterus was even larger than the present specimen, and the yellow white growth and the closely set nuclei, which alone took the stain, led me to think during life that the case was one of sarcoma. The autopsy, however, showed that it was a carcinoma, the great bulk of the tumour being caseated as in the case now shown. The specimen has unfortunately been lost, but, through the kindness of Sir John Williams, I am able to show sections of the growth. With the exception of these two cases I am unacquainted with this extensive caseation of corporeal carcinoma.

and do not remember to have read of a similar case. It seems probable that by the gradual pressure of the growth below, the more superficial parts of the tumour become lowered in vitality and degenerate into an aseptic caseated mass, being preserved from ulceration and destruction by the absence of micro-organisms in the virgin uterus.

The patient from whom the uterus now shown was removed was a virgin, aged 55, who was admitted to University College Hospital on October 28, 1896, complaining of leucorrhœa, metrorrhagia and pain in the left groin. The patient had noticed the leucorrhœa for the first time ten months previously; it came on very gradually, the only other symptom being weakness. The white discharge continued, slightly increasing in amount, till August, when the patient had a bad "flooding," losing about a pint of blood. After this the discharge was of a bright red colour for a time and later became more copious but serous in character, only slightly tinged with blood; it was not offensive.



Caseating carcinoma of the corpus uteri. Section of the undegenerated part (high power).

Menstruation began at the age of 14½; it was always regular and painless, lasting three days and needing twelve diapers. The menopause occurred four years ago. The patient's mother died of a disease of the womb "similar to her own."

On examination the intact hymen just admitted the finger; the cervix was directed forwards; behind it was a round, hard tumour as big as a fist. Examined *per rectum* the tumour felt hard, smooth and movable; it was thought to be probably a fibroid in the posterior wall, but it was decided to explore the cavity to find out the cause of the discharge. This was done on November 3. The uterus was found to be as large as the pregnant organ at three and a half months; the sound passed for 4¾ in. On dilating the uterus with sounds and passing a curette the uterus was found to be filled with soft growth, a small piece of which, removed with the curette, was of a yellowish white colour, and under the microscope showed degenerated tissue which stained badly, only showing faint indications of the nuclei. On November 9, 1896, the uterus was removed by Dr. Spencer by the combined vagino-abdominal method, the external os being first stitched up with silver wire. The ligatures of the broad ligaments were left long and were drawn down into the vagina, and drainage was carried out by means of a piece of iodoform gauze extending from the opening in the peritoneum to the vagina. This was drawn out of the vagina on the eighth day; the ligatures were removed by traction on the nineteenth day.

The patient recovered; the axillary temperature, taken every four hours, only reached 100° F. on one (the third) day. On account of weakness, however, the patient did not leave the hospital till December 19, when she was quite well. She remained in good health for another month; but I was informed by her doctor, Mr. Harman Visger, that she died after seven days illness on January 26, 1897, of acute gastritis which began after a meal of stewed mutton and carrots, of which she ate an enormous quantity. Pain came on the same night and vomiting next day; from the third day the vomit was "coffee-ground." There was no sign of obstruction and the bowels were opened daily till two days before death.

DISCUSSION.

Dr. HEYWOOD SMITH asked the President to what he attributed the abnormal thinness of the uterine wall; whether to the progress of the disease, independent of the localised thinning at the base of the tumour.

Dr. T. G. STEVENS asked why the President termed this a "caseating carcinoma." Caseation is recognised in tuberculous and syphilitic lesions, but not as a rule in malignant growths. In this specimen microscopically the condition is one of necrosis and not caseation.

Dr. HERBERT SPENCER, in reply, said he used the term "caseating" because the greater part of the growth was converted into a yellow cheesy mass in which nothing but faint indications of nuclei was visible on microscopic examination. The ordinary necrosis of malignant growths associated with sepsis was, he thought, quite a different condition. If Dr. Stevens had a specimen similar to the one shown to-night he hoped he would bring it before the Section. Personally, he knew of no record of a similar case.

Hæmatosalpinx complicating Myoma.

By H. MACNAUGHTON JONES, M.D.

History.—The patient, a very stout woman of a hysterical temperament, from whom this large tube was removed, was aged 44. She had been twenty years married and had never been pregnant. She had suffered from asthma and, a year since, had an attack of facial paralysis. She was subject to menorrhagia for some time and lately to a metrorrhagic discharge and considerable abdominal pain. For the past three years she had had constant pain in the left side, extending to the leg, and more recently there had been frequent micturition with pain. The day previous to her journey to London, made two days before I saw her, she had a severe rigor attended by vomiting, and a temperature of 103° F. The diagnosis made by an able practitioner was "degenerating and suppurating myoma."

Examination disclosed a tumour rising halfway to the umbilicus and a myomatous uterus, immovable and filling the pelvic cavity. From the whole history of the case I concluded that the recent symptoms were more likely to be due to adnexal trouble, and probably a pyosalpinx; I operated on December 23, 1907.

Note on Operation.—Anæsthesia: the scopolamine, morphia, and chloroform method (with previous injection of strychnine and atropine) was employed. Chloroform was given with the Vernon Harcourt regulator by Mr. Herbert Scharlieb. The incision ran from above the umbilicus to the pubes through some $2\frac{1}{2}$ in. to 3 in. of fat. Anæsthesia had to be discontinued for twenty minutes owing to the cyanosed condition of the patient; the omentum was found adherent and part had to be removed; a large mass of exudation was found at the left side above the pelvis, dense and firm adhesions attaching it to the sigmoid, broad ligament, posterior surface of the uterus, and bowel; the adhesions stretched across to the cæcum and appendix. The uterus was myomatous, about the size of the fist, with small nodules protruding from the surface, and one larger one anteriorly which impinged on the bladder.

The left ovary came away piecemeal in detaching the adhesions, being quite soft and degenerate. The right ovary was healthy. I did not remove the uterus; the condition of the patient did not permit this, the operation being necessarily tedious and difficult, lasting (including the delay under anæsthesia) one hour and fifty minutes.

Dr. Cuthbert Lockyer's microscopical report is as follows: "Mounted as a museum specimen there is shown a dilated tube, divided in its long axis. Externally it presents as a coiled sausage-shaped tumour, with its two extremities bent so as to meet in actual contact. In cut section the main part of the lumen is widely distended by a blood-stained, now coagulated, material, which, on section, yields jelly-like surface. The lumen is interrupted where the tube has been kinked upon itself. It is uncertain whether the specimen includes ovarian tissue in its centre or not."

The lesson to be learned from this case is the extreme difficulty that is often found in diagnosing some cases of adnexal disease and tumour when complicated by uterine myoma or adhesions to the uterus. Sometimes it is impossible save by exploration. The operation was performed on December 23 and the patient left the Home quite well on February 8.

DISCUSSION.

Mr. ALBAN DORAN observed that Dr. Macnaughton Jones did not remove the uterus in his case, where there was double hæmatosalpinx. It was possible that the uterus was malformed in this instance, as fibro-myoma was relatively frequent in cases where the uterus was subject to arrest of development, whilst hæmatosalpinx had been recorded more than once. He referred to an article on uterus septus unicollis associated with both those complications, written by Dr. Cuthbert Lockyer and himself and published in the *British Journal of Obstetrics and Gynæcology* early in 1905. Pyosalpinx was most probably due in most cases to infection from blood and mucus pent up in the uterine cavity because the fibroid mass, or several such masses, prevented their free escape into the cervical canal; so it was, at least, in several fibroid uteri which he himself had removed. He related a case where traumatism seemed clear. A woman, aged 41, came under his care for a uterine fibroid two years ago. Over three years before the operation she fell down in her dining room, striking her abdomen against a big roll of linoleum. Symptoms of peritonitis followed, with frequent attacks later on of hypogastric pain. He removed a large fibroid with a pyosalpinx on one side and a slightly dilated Fallopian tube on the other. When pyosalpinx, in a young subject with uterine fibroid, was unilateral, the opposite tube and ovary, if healthy, should not be sacrificed. Mr. Doran had reported three such cases in his Harveian Lectures, and the patients were still doing very well with one ovary.

The PRESIDENT (Dr. Herbert Spencer) said he had been surprised, on examining a large number of myomatous uteri, to find how frequently they were associated with diseases of the appendages: hydrosalpinx, pyosalpinx, ovarian and tubo-ovarian cysts. He did not, however, remember to have met with hæmatosalpinx, and asked whether it was not possibly due, in the specimen exhibited, to reflux of blood from the uterus.

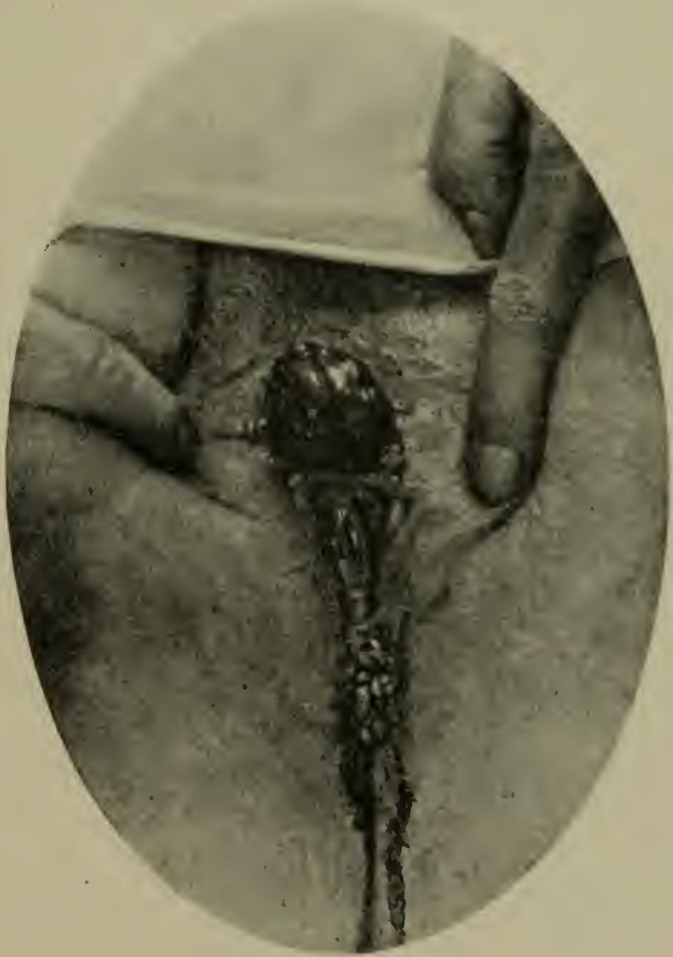
Dr. MACNAUGHTON JONES said he quite agreed with Mr. Alban Doran that, in the great majority of adnexal affections, as in hæmatosalpinx, the origin of the affection was in the uterus and did not commence primarily in the tube. In his case the other ovary, being healthy, was not removed. In some of these cases, doubtless, there might be, as suggested by the President, a reflux from the myomatous uterus. Hæmatosalpinx was not uncommon in those cases in which there was a kink in the tube and where the horseshoe form with obliteration of the mesosalpinx was present.

A Melanotic Tumour of the Vulva.

By EARDLEY HOLLAND, M.D.

THE patient, a multipara, aged 73, was admitted to the Hospital for Women, Soho Square, on August 10, 1907, under the care of Dr. R. T. Smith. For the past eleven months she had noticed an irritation and itching of the vulva, which had drawn her attention to a tumour "like a small black cherry." Her own doctor tied a ligature round the base of the tumour, allowing it to slough off, subsequently cauterising with silver nitrate. A month later the same symptoms returned and she again noticed a similar tumour in the same position as the former one, so she came to the hospital. On examination an irregular ovoid tumour, the size of a bantam's egg and of a black colour, was seen occupying that part of the vulva immediately above the clitoris (*see* fig.). It arose by a broad base and was not ulcerated. The lower margin of the tumour just reached the prepuce of the clitoris, but the clitoris itself and its prepuce were not involved in the growth. The surrounding structures were free from infiltration. On the right side two enlarged inguinal glands were felt; on the left side there were no enlarged glands.

On August 14 operation was performed. The inguinal incisions were first made; the inner ends of these were then united by a circular incision surrounding the tumour and extending well wide of it. The skin around these incisions was then under-cut, and both sets of inguinal glands, with the fat and connective tissue of the groins and the tumour itself, were removed in one continuous mass, care being taken to remove as much tissue as possible deep to the tumour. The clitoris and anterior third of each labium minus were necessarily removed. The incisions were sewn up and the wound healed by first intention. The patient is now attending Dr. Oliver as an out-patient, and he reports that so far (February, 1908) there has been no recurrence.



Melanotic Tumour of the Vulva.

Microscopical Examination.—The tumour is covered with skin and is composed of irregular round- and spindle-shaped cells, lying in a loose reticulated stroma. The pigment lies both within the cells and in the connective tissue between them, and is so abundant as to almost mask the structure of the tumour, but in certain places an alveolar arrangement of the cells can be clearly seen. In certain places, also, the skin papillæ can be seen dipping down and gradually merging into the tumour-cells. The tumour is evidently a melanotic carcinoma.

Melanotic tumours of the vulva are rare. A careful search through the literature has revealed thirty-one reported cases, the earliest of which is reported in the *Lancet* of 1851 by the late Sir William Fergusson. The labia majora and minora seem to be the commonest sites of these growths. Out of twenty-eight cases in which the position was noted nine grew from the labium majus, eight from the labium minus, three involved both labia and clitoris diffusely, three involved the clitoris alone, three the vaginal walls, one the mons veneris, and one the perinæum. A microscopical report was given in twenty-one of the cases; of these seventeen are recorded as melanotic sarcomata, three as alveolar melanotic sarcomata, and one as a melanotic carcinoma. Mention of glandular involvement was made in twenty-two; in sixteen they were affected and in six unaffected. Operation was performed in twenty-two of the thirty-one cases, and after histories are given in seventeen; in four no recurrence had occurred, one after eleven years and another after three years, but two of these after histories are too short to be of any value: one of five months and the other of only six weeks. In the remaining thirteen recurrence occurred, in the majority very rapidly. This shows how extremely malignant these melanotic tumours are.

My best thanks are due to Dr. R. T. Smith for so kindly permitting me to report the case.

DISCUSSION.

Mr. ALBAN DORAN would have liked to have heard what Dr. Eardley Holland held to be the significance of melanosis in this kind of new growth. The pigmentation was strangely irregular in these cases. In May, 1907, he read before the Obstetrical Society a report of a case of malignant vaginal polypus. There were also three sessile growths in the vagina, and the mucosa over one of the three was pigmented. The primary growth was an adrenal tumour of the right kidney. Three months after the kidney was removed the patient died, with numerous metastatic growths in the viscera, but none of them were pigmented. Horn's case was worth remembering. Pigmentary growths in the vulva developed after a primary sarcoma appeared in the vagina; the mucosa over the primary tumour was pigmented, yet the tumour itself was not pigmented. Some infected inguinal glands were found to be pigmented, yet a great malignant medullary mass which developed in the pelvis and abdomen and caused the patient's death proved to be quite devoid of pigment. Horn and Morestin explained away their cases, and, by implication, all other instances of "melanosis" of the vagina, attributing them purely to hæmorrhages. Mr. Handley's recent Hunterian Lectures on melanotic growths deserved close study. One clinical fact was certain—pigmentation of a vulval or vaginal tumour was a most unfavourable symptom, indicating a high degree of malignancy.

Dr. HOLLAND, in reply, said that he was glad that Mr. Doran emphasised the importance of removing the glands and the tumour in one mass. If once the connections between the tumour and the affected glands were divided there was always danger of disseminating cancer-cells and causing local implantation. Three of the inguinal glands were affected on the right side but none on the left. There was no leukoplakial condition, nor were any melanotic tumours observed in the tissues removed except the three lymphatic glands.

Placenta diffusa.

By AMAND ROUTH, M.D.

DR. AMAND ROUTH showed a "placenta diffusa" which had "presented" at the os uteri like a true "placenta prævia centralis." The woman was admitted to Charing Cross Hospital suffering from severe hæmorrhage which had continued with intermissions for twenty-four hours. There was a history of amenorrhœa of over five months duration preceding the hæmorrhage. On examination a uniform central tumour in the abdomen was felt reaching above the umbilicus. The tumour was as hard as a stone, but occasionally would slightly relax for a few seconds, becoming then obscurely elastic. No sounds were to be heard over the tumour. By the vagina the cervix was dilated to the size of a five-shilling piece and a hard but superficially friable mass was felt to be protruding. This felt more like a disintegrating fibroid than placental tissue.

The patient was anæsthetised and the protruding mass was easily detached by the fingers and found to be placental tissue with numerous interstitial hæmorrhages. Further examination showed that the piece removed had been separated from a very thick and tense membrane and that a fœtal head was presenting high up. The tough membranes were incised and the fœtus, which was dead, was delivered by podalic version. Version was practicable and safe, for although the uterus was in a state of tonic contraction, there was not any marked thinning of the lower segment. The placenta was then easily detached and expressed, and was found to cover the whole of the intra-uterine surface down to the internal os. The cord was inserted about half way up towards the fundus uteri. The uterus contracted down well, and the woman has made an excellent recovery.

It was ascertained afterwards that ergot had been given every four hours, and this no doubt explained the tonic contraction of the uterus. The apparent hardness and solidity of the presenting placenta was also explained by the intact membranes being rendered tense by the tonic uterine contraction. The placenta appears to be a good example of a diffuse placenta. It was very thin everywhere except at the presenting portion, which nearly corresponded to the free pole of the chorion, opposite to the insertion of the umbilical cord.

Remarks.—Apparently owing to an unusually abundant supply of blood to the decidua reflexa or capsularis in this case the chorionic villi over that free area have failed to atrophy, and the entire periphery of the ovum is covered by functional villi, so that the placenta, instead of being discoid and limited to the decidua serotina or basalis, has become diffused over the entire chorion. Whitridge Williams has a figure of a similar placenta in his "Obstetrics" (p. 589), but he calls it "placenta membranacea." It is sounder to call it "placenta diffusa," as it is certainly more diffuse than the polycotyledonous type of placenta (which is called diffuse) found in certain animals, such as the hippopotamus, whale, lemur, pig and camel. A "placenta diffusa" is almost necessarily "membranacea," but that condition is in consequence of its being diffuse, and is not the essential distinguishing feature. It is obvious that a placenta which is universally diffused must be also "prævia" at its presenting point, resembling, therefore, in that respect the variety of placenta prævia developed from a so-called placenta reflexa. It is also difficult to understand how such a diffuse placenta can avoid becoming detached during the normal growth of the uterus during pregnancy, and the premature labour in this case may be explained by such detachment.

The PRESIDENT (Dr. Herbert Spencer) said he had not previously seen a specimen of this kind of placenta, but he was well acquainted with the thickened, hard, presenting placenta in placenta prævia. It was due to clotting of blood effused into its tissue, and was not uncommon, and sometimes gave rise to difficulty in the diagnosis of placenta prævia.

Obstetrical and Gynæcological Section.

March 12, 1908.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

Abdominal Myomectomy during Pregnancy.

By W. C. SWAYNE, M.D.

THE propriety of removing fibroids from the pregnant uterus by myomectomy depends, when this operation is undertaken for the removal of tumours not likely to cause obstruction to labour, on the presence of symptoms, due to the existence of these tumours, of sufficient severity to indicate distinct risk to the patient. The two cases hereafter described illustrate some of the conditions which may necessitate interference of this kind.

Case 1.—A primipara, aged 40, five months pregnant, was sent to consult me on account of pain and rapid increase of growth in a solid tumour, obviously growing from the fundus of the uterus. Owing to the encroachment of the tumour on the available space in the abdominal cavity, and the pain produced by it, it was decided to perform laparotomy with the object of removing the tumour. On opening the abdomen a pedunculated fibroid, the size of an adult head, was found growing from the fundus of the uterus. Its pedicle was broad and thick, its attachment to the uterus measured about 2½ in. by 1 in.

The pedicle was transfixed and the tumour removed by a "V" shaped incision, the flaps being united by continuous catgut sutures, and the peritoneum sewn over them with fine silk. After this a second tumour, sessile and of the size of a Tangerine orange, was discovered on the posterior surface of the fundus, just below the pedicle of the first tumour. Rather more than half the tumour projected from the peritoneal surface of the uterus. Its capsule was incised and the tumour enucleated without difficulty, its bed closed by continuous catgut sutures and the peritoneum united over this with fine silk. The patient made an uneventful recovery and was discharged from hospital a month later without any sign of interruption of pregnancy. Unfortunately she was lost sight of at the end of two months, up to which time her pregnancy had been uninterrupted, so that I do not know whether she went to full time or not. Her symptoms were entirely relieved as the result of operation.

Case 2.—A multipara, aged 35, was sent to me on account of severe and increasing abdominal pain associated with pregnancy and the presence of a tumour in the pelvis. On examination the usual signs of pregnancy were found to be present. The pelvic tumour was bilobed and in outline resembled the heart on a playing card. There were two rounded projections, one of which was soft and the other hard, rising above the pelvic brim—the softer part was felt to be on the right and the half of firmer consistency on the left—and each of the approximate size of a pregnant uterus at four months. Laparotomy was performed, and after some trouble the whole mass was eventrated, when it was found that it consisted of the pregnant uterus with a large fibroid growing from the right cornu, the fibroid and the pregnant uterus being approximately of the same size. Axial rotation of the uterus had occurred, which was responsible for the difficulty in delivering the tumour: the right uterine cornu and fibroid lay in the left iliac fossa, while the enlarged pregnant fundus was displaced into the right. The capsule of the fibroid was incised and it was enucleated without any great difficulty, leaving a large bleeding cavity. This was closed by a treble tier of continuous catgut sutures and the peritoneum united over it with fine silk. The patient left the hospital at the end of a month, after an uneventful recovery, no sign of interruption of pregnancy having occurred. Unfortunately after her return home, and about two months after operation, premature labour occurred, from which, however, she recovered without any serious complications. In this case interruption of pregnancy would almost certainly have occurred sooner or later, owing to the fact of axial rotation of the uterus being present, the reduction of which, after the laparotomy incision had been made, was a matter of no small difficulty.

These two cases illustrate a fact which has been noticed by Bland-Sutton, Gemmell, Doran, Hirst and others, that the pregnant uterus is by no means so intolerant of surgical intervention as has been supposed. Dsirne, for example, out of 130 odd cases of such intervention which he collected, found that pregnancy was interrupted in less than thirty. The effect of the presence of fibroids with pregnancy may be a source of considerable danger; Nusse, Susserot and Lefour have estimated the maternal mortality under these circumstances at from 50 per cent. to 60 per cent.—almost incredible figures at the present day.

The question of obstruction to labour is not intended to be dealt with in this communication, but one case of rupture of the uterus and two of severe post-partum hæmorrhage have been brought to my notice.

The effect on the tumour of the occurrence of pregnancy may be to produce degeneration, and Dr. Purslow described such a case in a paper read before this Section a few weeks ago.

The indications for operation would appear to be as follow: An exploratory laparotomy should be undertaken in cases in which a pregnant woman, known to be suffering from fibroids, suffers from great pain, associated with rapid growth of the tumour in cases in which either twisting of the pedicle of the tumour or axial rotation of the uterus is suspected or proved to be present or in cases in which the uterus has become retroverted and impacted in the pelvis. If, after laparotomy, it appears that the tumour is one that can be removed without encroaching too much on the uterine wall or at all on the uterine cavity, its removal by myomectomy may be undertaken. Should the tumour be sessile, the whole of the cavity from which it has been removed must be obliterated by successive rows of catgut sutures and its sutured edge covered by peritoneum. If the tumour is pedunculated the pedicle may be transfixed, but it is probably better to endeavour to form flaps from the pedicle, to unite these with buried catgut, and to bury the cut edges by a Lembert suture of the peritoneum.

One rather important point has been raised by Doran in connection with this operation, and that is the probable result of parturition on the scar left in the uterine tissue after removal of the tumour. Since we know that after Cæsarean section parturition can be safely accomplished, there would be no valid reason for supposing that similar results cannot take place in these cases. The only disturbing factor is that the period which elapses between operation and parturition—though long enough to allow of a fairly firm scar being produced—is not so long as the period that will elapse before parturition takes place in cases of Cæsarean section, after which, even if pregnancy should occur, parturition is not likely to take place, at any rate within ten months of the operation.

I may say that a case of mine—a patient who had been subjected to Cæsarean section, on account of the impaction in the pelvis of an adherent dermoid cyst of the ovary—passed safely through her second parturition four years after operation without any kind of complication whatever.

Case of Pregnancy complicated with large Retroperitoneal and Subligamentous Fibro-Myoma.

By John H. Dauber, M.B.

Mrs. C., aged 31, married three months, was brought to me on December 11 last year by one of her medical advisers. The last catamenial period occurred on September 16, previously to which she had always been regular and the flow normal. No abdominal swelling was noticed until the spring of last year. Since then it had rapidly increased, especially latterly. The patient complained of being so large a size, and as she considered she was only three months pregnant she feared there was something wrong. She had already consulted two other medical men, who diagnosed that she was probably pregnant but that the pregnancy was abnormal, being complicated by a large tumour which would prevent her going to full term, and that an operation was necessary, so that it was only left to me to confirm, or otherwise, the diagnosis already made and the treatment suggested.

The patient was a small, slightly made woman, bright and alert, not ill at all. Upon examination it was found that the abdomen was occupied by a large, irregular, solid tumour, rising almost to the ensiform cartilage. It lay mostly to the left of the middle line. Its right border was clearly defined, about 2 in. to the right of the umbilicus. No fœtal movements were detected, no fœtal heart sounds heard, no rhythmical contractions felt, but over the whole of the tumour a loud hæmic bruit was heard. The breasts were enlarged and tender, the areola of pregnancy marked, but no secretion was obtained.

Per vaginam, a hard, round mass was felt coming down into the pelvis to within 2 in. of the vaginal outlet and continuous with the abdominal tumour; it was quite fixed; it pushed the vagina—which was narrowed and greatly elongated—to the right, so that the examining digit passed it with difficulty. The right vaginal fornix, together with the cervix, was drawn up completely out of reach. The uterus could not be made out as distinct from the tumour; where it lay or to what extent it was involved in the tumour could not be ascertained.

The condition seemed to be a three months pregnancy, complicated by a large fibroid. It was quite evident that pregnancy could not go on to full term, as the pelvis was entirely blocked and the abdomen occupied already by a tumour as large as a uterus nine months pregnant. I agreed with the previous diagnosis and advised early operation.

Eight days later, on December 20, in a nursing home, with Dr. Mansell Moullin, who kindly assisted me, and Mr. Ogle, who gave the anæsthetic, I operated. Dr. Card, the patient's doctor, and another medical man were also present. A median incision was made from above the pubes to half-way between the umbilicus and the ensiform cartilage. A large, irregular, solid tumour was exposed, lying to the left and extending from deep in the pelvis to under the arch of the diaphragm; it was fixed and retroperitoneal throughout. Somewhat behind, and overlapped by the tumour, in the right iliac fossa, lay the pregnant uterus, adherent to the tumour by its cervix, which was greatly lengthened. The intestines were adherent over the upper part of the tumour by many adhesions; it took some little time to clamp, tie off, and free them. In peeling off a piece of gut the capsule of the tumour was torn, and as it was obvious that it would shell out of its bed the rent was enlarged, a hand passed in, and enucleation rapidly proceeded with. In a few seconds it was free with the exception of its pedicle, which, the size of a small wrist, had a firm attachment to the neck of the uterus. The hæmorrhage from the bed of the tumour was very great: it would be no exaggeration to describe it as appalling, except that nothing appals an operator; but so profuse was it that we feared the patient would die then and there on the table. Large swabs, gauze packing, and forceps were rapidly applied, the cervix uteri and base of the tumour firmly grasped, and the aorta compressed, with the result that the hæmorrhage was controlled to some extent. The base of the tumour was then cut through, as it would not shell out, and with it the left uterine artery, which had been previously seized with forceps. An attempt was now made to finish off the operation and save the uterus, but in spite of underpinning, ligature of many vessels, deep sutures into the cervix, &c., it was found impossible to control the hæmorrhage. There was little time for further deliberation; immediate action was imperative, so with much regret I amputated the uterus supravaginally. The left ovary had to be removed, the right was left. The cervix had been so lengthened, cut into, and weakened by the removal of the tumour that the body of the uterus, previous to amputation, hung much like a cherry on a stalk. The removal of the uterus enabled us to deal successfully with the hæmorrhage.

The uterus was sacrificed for these two reasons: (1) the difficulty of controlling the hæmorrhage, which had already been excessive, and (2) because to leave the uterus with its elongated and damaged cervix seemed to be adding a risk of the utmost gravity to a case already sufficiently serious. I may say that Dr. Mansell Moullin fully concurred in this view.

It now merely remained to cut away the superfluous peritoneum which had covered the tumour and to sew the cut edges together, but upon removing the gauze plugging from the cavity a great burst of hæmorrhage again occurred. Many large vessels had yet to be tied, and at one time it appeared that the gauze plugging would have to be left in. This eventually proved to be unnecessary. The abdominal wound was closed in three layers of continuous sutures. I used "Triolet" catgut throughout the operation.

For the first few days the patient suffered considerably from shock, and any further complication, such as miscarriage or uterine hæmorrhage, would have been most undesirable, to say the least of it. For the rest, the recovery was uninterrupted and complete. The stitches were removed on the eighth day and the patient was sitting up in bed towards the end of the second week.

Cases of pregnancy complicated by fibroid tumour are always interesting, because there is a double issue at stake, and it was a great regret to me that I was unable to save the uterus in this case. The fact that the tumour was beneath the left broad ligament and had then burrowed up behind the peritoneum as far as the left kidney created the difficulty. Rapidity of growth and extreme vascularity one expects to find together. Pregnancy was a further stimulus in both these directions, for it is often possible to enucleate large broad ligament fibroids almost bloodlessly.

(The tumour, uterus, and microscopical slides were exhibited.)

DISCUSSIONS.

THE PRESIDENT (Dr. Herbert Spencer), while not criticising the three cases reported, in which the operations were done for definite and serious indications, felt bound to express his strong opinion that operations in the case of fibroids complicating pregnancy were rarely called for, and that myomectomy, which was occasionally urgently demanded in the case of very large or impacted or rotated tumours, was, in relation to the frequent occurrence of this complication of pregnancy, very rarely required, and, as the cases exhibited that night showed, was attended by considerable risk. When practicable the operation should be postponed till the child was viable. He wished to protest against the figure quoted by Dr. Swayne (50 per cent.) as the rate of mortality for labour in cases of pregnancy complicated by fibroids. Professor Pinard's experience showed that the risk was slight, and interference in the early part of pregnancy was rarely required. He (Dr. Spencer) had seen a large number of cases of pregnancy and labour complicated by fibroids, yet the only case which terminated fatally was one in which myomectomy was performed for a strangulated myoma which had caused peritonitis. Dr. Matthews Duncan had pointed out the danger and the rarity of strangulation many years ago. He (Dr. Spencer) had published the case of a woman who carried a fibroid tumour weighing over 17 lb. till the end of pregnancy. The tumour was enucleated successfully a few hours before labour. He had also twice performed Cæsarean section for fibroids at the end of pregnancy. These four operations were the only ones he had performed for fibroids during pregnancy. He believed it would be the opinion of every experienced obstetrician that only in rare circumstances and for serious indications was it necessary or advisable to perform myomectomy in the early months of pregnancy.

Dr. CHAMPNEYS said that if the President had not made the remarks which they had just heard, he had intended to make practically the same remarks himself; as it was, he entirely endorsed them. Such statistics as those quoted by Dr. Swayne (who, though he did not endorse them, at the same time did not criticise them), giving a mortality of 50 per cent. to 60 per cent., were almost certainly derived from a collection of very exceptional cases, and were entirely contrary to the experience of those whose practice had extended over a long time. He had himself had a long experience of pregnancies complicated by fibroids. It was true that in exceptional cases he had been compelled to adopt serious measures, such as Cæsarean section and others mentioned by the President; but he had frequently been consulted in cases in which the presence of a fibroid in the pregnant uterus had frightened practitioners, both in general and in special practice, into advising interference of various kinds which he considered quite unnecessary. In the event the patients had borne not one child but a series with perfect ease and safety. In his experience the cases requiring serious interference (though such occurred, and should be dealt with unhesitatingly) were extremely rare.

Dr. HERMAN agreed with the last speaker that the estimate that in pregnancy with fibroids the mortality amounted to 50 per cent. was far too high. It was partly accounted for by the fact that Lefour's paper, from which this estimate was taken, was published in 1880, and therefore many of the cases upon which it was founded had been treated when antiseptics were unknown. Operation might sometimes be indicated, even though there were no symptoms, on account of difficulty of diagnosis. In cases of uncertain diagnosis it might be better for the patient to have a possibly unnecessary operation performed than for her to be left with a lump within her capable of dangerous developments later on. In July last he had seen a patient, aged 35, whose last menstruation had ceased on April 3. She had a solid lump in the usual situation of the pregnant uterus and a softer swelling behind the cervix. He advised operation because he thought the soft swelling behind the cervix might be an ectopic pregnancy. It proved to be the body of the retroverted pregnant uterus, with a fibroid growing from its anterior wall. On July 11 the fibroid, which weighed 14 oz., was enucleated and the wound sewn up without difficulty. The patient was delivered of a female child weighing 7 lb. on January 10. The only abnormal feature of the labour was that the placenta was very slow in coming away, so that the doctor in attendance (Dr. Waldron, Billericay) thought it necessary to put his hand into the uterus to remove it, and found that it was adherent along the anterior wall. He could not offer an explanation how stitching of the peritoneal covering of the uterus should cause a morbid change of the endometrium, but he nevertheless could not regard their combination as a mere coincidence.

Dr. MACNAUGHTON-JONES said that the statistics of Pozzi and Pinard were convincing; the former, in 1900, stated that in five years he had seen eighty-three cases of myoma in 12,000 labours, and had operated four times; the latter, at the Baudeloque clinique, had eighty-five cases out of 25,000 parturient women, and had only operated on twelve. German and American authorities generally were in favour of non-interference. This was Hofmeir's view, who had specially studied the matter. Howard Kelly rejects all radical measures unless the symptoms are urgent. At the International Medical Congress in 1903, where this question was fully discussed, the general view of American gynæcologists was in favour of non-interference. It had always appeared to him (Dr. Macnaughton-Jones) that the situation of the tumour was one of the most important elements determining interference, as where a myoma occupied the lower segment of the uterus, when natural delivery became impossible. He had brought such a case before the Obstetrical Society, in which supravaginal hysterectomy had to be performed, a living child being then removed from the uterus. Recently he instanced another case in which he performed myomectomy. Here it was unavoidable; premature labour followed. Save in cases where the mother's life was in danger, or where it was impossible to save the life of the child without interference, he considered it safer not to interfere.

Dr. AMAND ROUTH agreed with Dr. Swayne's statement that fibroids complicating pregnancy should not be interfered with unless producing urgent symptoms. Unfortunately Dr. Swayne had quoted statistics somewhat obsolete in date, tending to show that fibroids were so serious a complication of pregnancy that operations were frequently justifiable. Dr. Routh thought these statistics quite unreliable. He had collected statistics[1] showing that the maternal mortality of such cases under modern methods was only slightly in excess of the normal, and that the danger to life was not so much due to risks during labour as to sepsis afterwards, for if the endometrium became infected a submucous or intramural fibroid almost always became infected also. He showed that abortion did not more often occur where fibroids were present, though labour often ensued a few weeks before full time. He urged strongly that no operation, unless absolutely essential, should be performed till fœtal viability, so as to save the two lives involved. He had only twice had to perform Cæsarean hysterectomy at or near full term, and never at an earlier date, though he had seen many cases of fibroids blocking the pelvis in the early months. The fibroids in such cases almost invariably underwent flattening and softening (*assouplissement*), and were gradually or suddenly displaced out of the pelvis, sometimes as late as the onset of labour itself, and labour spontaneously occurred without assistance.

Dr. EDEN asked if Dr. Swayne would give the Section further information about the case he referred to in which rupture of the uterus was due to the presence of a fibroid tumour. He could not understand how a fibroid tumour could lead to rupture of the uterus in labour unless it was so situated as to cause insuperable obstruction. Was this the explanation to Dr. Swayne's case? Two cases of fibroids had also been mentioned in which severe post-partum hæmorrhage had occurred. He believed that this was only occasionally met with in such cases; the presence of an interstitial or subserous fibroid did not greatly interfere with uterine retraction, but if the placenta became implanted over a submucous fibroid, no doubt serious post-partum hæmorrhage might occur. He agreed with previous speakers as to the rarity with which serious complications occurred when women with fibroids became pregnant, and deprecated the view sometimes advanced that pregnant women with fibroids necessarily went in peril of their lives.

Dr. ARTHUR GILES said that speaking in generalities would lead to confusion and inaccuracy. To say that the complication of pregnancy by fibroids was generally unimportant was as much beside the mark as to say that it was generally dangerous. The existence of fundal fibroids, for instance, might make no difference to pregnancy or labour; such a case was in a totally different category to that of a case where a cervical fibroid was impacted in the pelvis. He had come across about a dozen cases that he could recall where fibroids and pregnancy were associated: in one he had to do a Cæsarean hysterectomy for obstruction during labour; in another there was a cervical fibroid occupying the broad ligament in such a way that delivery would have been impossible; in a third he was called to see a patient a week after delivery and found a large necrotic fibroid presenting at the external os; this was removed, but the patient had lost such an enormous quantity of blood since the confinement that she was almost pulseless at the time of the operation and died a few hours afterwards. Other cases were instances of fibroids in the fundus, where the patients went through a comparatively normal pregnancy and delivery. Now if these cases were merely massed together and the statement made that 25 per cent. of cases of fibroids associated with pregnancy were attended by dangerous complications, the statement would be accurate enough and yet entirely misleading. He would add a few words on the subject of the second case he had referred to, as it had a direct bearing on Dr. Dauber's case. The patient was four and a half months pregnant, and the fibroid occupied the left broad ligament, springing from the left side of the cervix. He enucleated the fibroid and met with very troublesome hæmorrhage, which was restrained with some difficulty. He was very anxious not to disturb the pregnancy, and when the bleeding had ceased he closed the abdomen, leaving the uterus. Secondary hæmorrhage occurred and he had to reopen, and only by removing the uterus could the bleeding be stopped. He expressed it as his opinion that when an operation was necessitated by the presence of a fibroid attached to the cervix, it would very seldom be possible to do a myomectomy and leave the uterus; hysterectomy would be generally required.

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[1] *Brit. Med. Journ.*, 1903, ii., p. 798.

Mrs. BOYD asked Dr. Swayne for particulars of the case of rupture of the uterus to which he had referred. She had on two occasions shown before the Obstetrical Society specimens of pregnancy complicated by fibroids where extreme thinning of part of the uterine wall was already present in the earlier months, and had mentioned the possibility of rupture, but she had found that this suggestion met with no support from the experience of the distinguished obstetricians present.

A Case of Difficult Labour.[1]

By HENRY RUSSELL ANDREWS, M.D., and R. DRUMMOND MAXWELL, M.D.

THE patient was a foreign Jewess, aged 38.

Previous Obstetric History.—She had never had a living child, had had several miscarriages, and some still-born children born without difficulty.

Present Pregnancy.—The last menstrual period had occurred ten calendar months, *i.e.*, over forty-four weeks, before labour began. She had noticed that her abdomen was larger than it had ever been before. At 5 a.m. on October 1, 1906, a maternity assistant, finding that there was no advance in spite of good pains, sent for the resident accoucheur. She was said to have been in labour two and a half days. The resident accoucheur found the patient's general condition good. The pulse-rate was 90 per minute. The pains were good, there was no tonic contraction, and the uterus was not tender. The circumference of the abdomen at the level of the umbilicus was 40 in. The child was presenting in the first vertex position; the fœtal heart could not be heard; the os was fully dilated. The head was bulging so much into the brim that the diagonal conjugate diameter could not be measured, but the pelvis appeared to be fairly roomy. The head was soft and there was a stinking discharge from the uterus.

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[1] For the first part of this communication, *i.e.*, the treatment of the case, Dr. Andrews is solely responsible. For the second part both authors are responsible.

Axis traction forceps was applied, but the head could not be made to budge. The resident accoucheur considered that, as the child had probably been dead for some little time there would be no great difficulty in delivery, so he perforated the head and attempted to deliver with the craniotomy forceps, but only succeeded in removing portions of the cranial bones. He then applied the cephalotribe and got a good grip on the head, but the whole of the vault and part of the face came away, leaving the rest of the base of the skull in its original position. Traction on the left arm brought it away from the trunk together with the scapula, and traction on the right brought away the forearm and the skin of the upper arm, the humerus remaining in situ. The resident accoucheur then brought down the left foot, hoping to deliver by version, but traction on the foot separated it from the ankle. He then made a final attempt at delivery by pulling with the crotchet fixed in the base of the skull, but the hook tore through the bone. Realising that the case was one of great difficulty, he brought the patient up to the London Hospital and sent for Dr. Andrews. When he arrived the patient was rather cyanosed and the pulse was rapid, about 120 per minute. He began his attempts at delivery with the idea that, as the child was decomposing, there could not be much difficulty in extracting it, but soon found that, on the other hand, delivery was by no means an easy matter. It is almost impossible to convey to others exactly where the difficulty lay. To say that the uterus was filled tightly with a decomposing friable fœtal mass courts the question: "Why did not you pull it out?" This is what he tried to do, with the help of every conceivable instrument, except a punch, for one and a half hours, with no success. The fœtal tissues were too friable for strong traction to be applied and not soft enough to collapse under pressure. He started by removing the right humerus and cutting through both clavicles, and then applied the cephalotribe to the base of the skull, which was pulled off without altering the position of the trunk. He perforated the chest and removed the heart and lungs, and perforated the diaphragm and removed the liver and most of the intestines.

An attempt was then made at delivery by fixing bone forceps on the cervical vertebræ, crotchet and blunt hooks between ribs, and pulling on all these instruments together; but the cervical vertebræ came away and the ribs gave way, all varieties of hooks simply tearing out of the chest wall. There was well-marked tonic contraction by this time, and a deep furrow could be felt on the anterior uterine wall. It appeared as if Dr. Andrews would have to open the abdomen, but he was most unwilling to do so if he could possibly avoid it. With the idea of removing the fœtus piecemeal, he pulled on the left ankle, attempting to shift the trunk sufficiently to cut through the spinal column; but first the fibula and then the tibia came away, and it was found to be impossible to pull on the knee. A hand was inserted with difficulty and with extreme caution into the fundus above a prominent ridge which ran obliquely across the internal surface of the uterine wall and the other leg was seized, but the hand and wrist were gripped so tightly that it was impossible to cut this leg off or shift it. Eventually, after one and a half hours of hard work, he had to admit that he could not extract the fœtus. Two courses were then open :—

(1) To put the patient back to bed undelivered in the hope that the fœtus might be expelled before the uterus ruptured; or

(2) To remove the uterus by the abdomen.

He chose the latter course, though with great reluctance. The vagina was cleansed and abdominal panhysterectomy performed as rapidly as possible, the vagina being clamped from above as in a hysterectomy by Wertheim's method. In spite of the large number of fœtal parts that had been removed previously, the uterus looked as large as it usually is in Cæsarean section. The operation lasted just half an hour.

The patient was fairly well at first, but twenty-four hours after the operation her breathing became extremely rapid, 70 to the minute, temperature 101·8° F., and she died twenty-eight hours after the operation.

At the post-mortem examination the stomach and intestines were much distended, the peritoneum had lost some of its lustre and was injected in places, the lungs were congested and œdematous throughout. The true conjugate measured 4 in.

Would it have been better if, instead of opening the abdomen, he had put the patient back to bed in the hope that spontaneous delivery might occur? It may be said that the uterus had been irritated into a condition of tonic contraction by the great amount of intra-uterine manipulation that had been carried out, and that rest and morphia might have overcome this tetanic condition. In answer to this it must be noted that the patient was under an anæsthetic at the time that the manipulations were being carried out, and that there was not much hope of any improvement in the condition of the uterine wall occurring as the result of rest. The height which the retraction ring reached on the right side denoted so great an elongation of the lower uterine segment that the risk of rupture seemed to be a grave one if much time were lost in leaving things to Nature, and though Dr. Andrews realised that his idea of the imminence of spontaneous rupture may have been an exaggerated one, as there was no great distension of the lower uterine segment, he knew of no standard by which he could have judged whether it was safe to leave this patient undelivered after the onset of tonic contraction before resorting to abdominal section.

We are showing specimens of frozen sections of the uterus removed by abdominal hysterectomy during the incompleted second stage of labour. The uterus with fœtus in situ was placed in a freezing mixture within a quarter of an hour of its removal; at the end of three hours the uterus was frozen solid, care being taken, by closing the lower aperture in the vaginal wall, that there should be no further extrusion of contents beyond those parts of the neck that already protruded. The specimen was then sawn through with a fine saw in two planes ¾ in. in front and behind the widest transverse diameter. After section of the uterus, the fœtal contents were lifted out of their uterine bed and weighed. The total weight was 6½ lb., and this after removal of the head, some cervical vertebræ, the thoracic viscera, most of the abdominal contents, both arms and one leg.

The median section, 1½ in. thick, thus resulting is the specimen, which has been mounted permanently for museum purposes in gelatine, so that both its surfaces are available for inspection.

The other two specimens exhibited to-night have been hardened in formalin with their contents in situ. These contents can be lifted out of their uterine bed, and show the accurate moulding of the lower uterine segment to the fœtal parts. The superficial fat is of unusual thickness.

Microscopic sections taken through the subcutaneous tissue do not show the presence of any pathological process or œdema as compared with sections of the superficial tissues of a normal full-time fœtus.

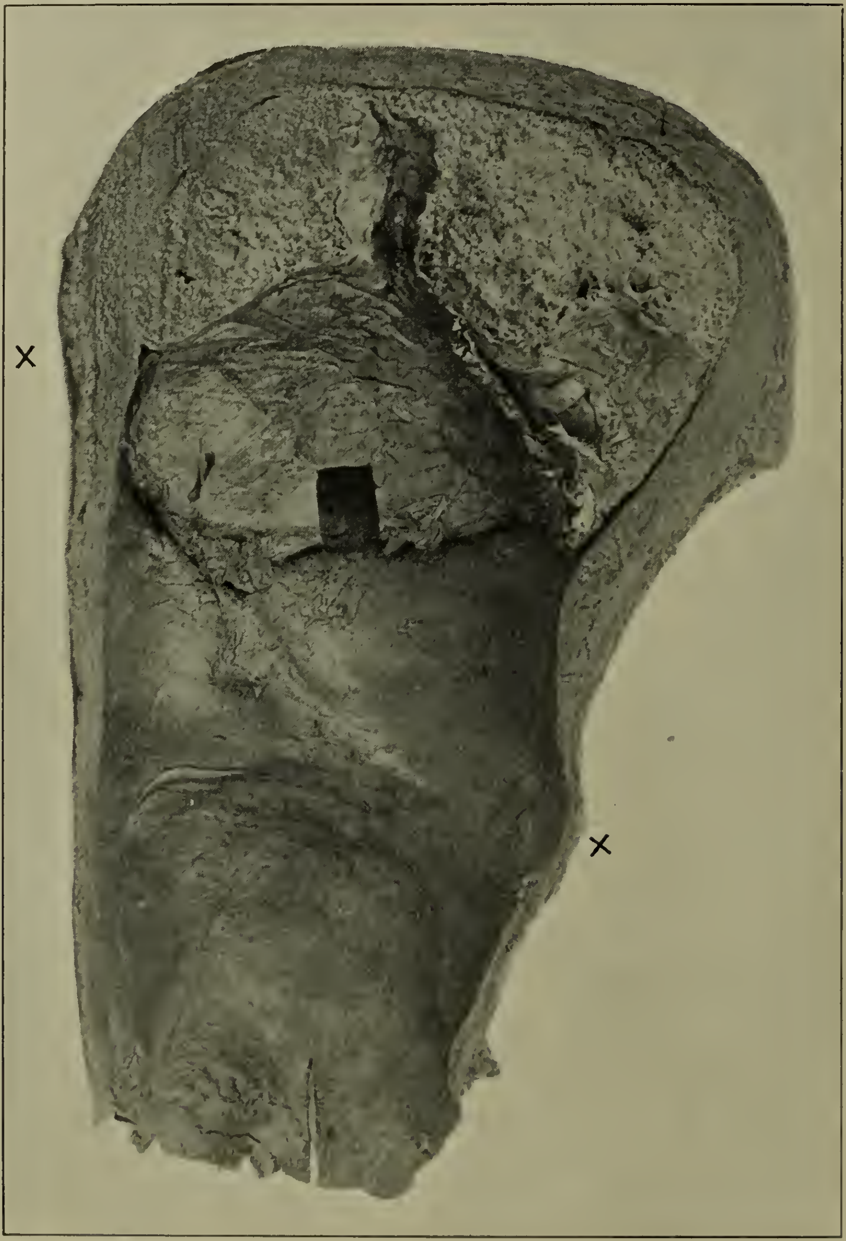

Fig. 1.

A prominent ridge runs obliquely along the inner wall of the uterus; its terminations are opposite the two points marked ×

Owing to desquamation the epithelial layers are shed down to the level of the stratum vitrosum. A thin slice cut from the upper cartilaginous epiphysis of the tibia shows a well-marked centre of ossification. On lifting out the fœtal contents from the anterior section, a distinct ridge is seen running obliquely upwards from the left to the right. On the right side of the uterus the termination of the ridge is at least 3 in. higher than on the left. Where the ridge joins the uterine wall on the right side section of the wall shows an abrupt alteration in thickness, and there can be little doubt that this spot marks the transition from the upper to the lower uterine segment (fig. 1). There is a similar transition in thickness where the ridge terminates on the left uterine wall, but this is not so clearly seen as in the opposite side.

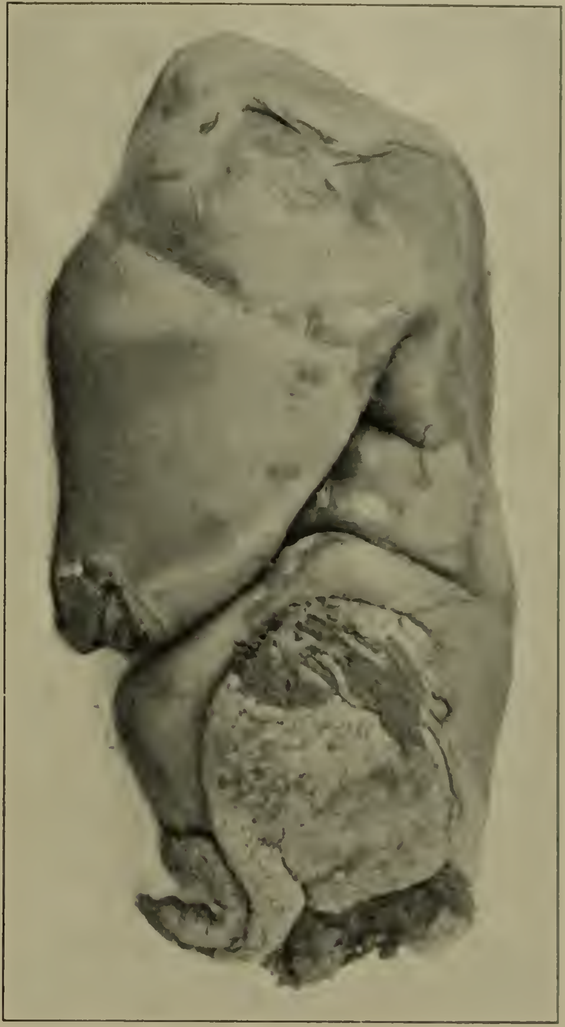

FIG. 2.

The groove between the flexed thigh and trunk corresponds accurately to the oblique line seen in fig. 1.

The specimen is shown chiefly to explain the causation of the oblique ridge, which projects sharply into the uterine cavity. This ridge will, we think, be held by Fellows to correspond to Bandl's ring or, to be strictly accurate, Braune's ring.

As regards the actual proportion of cervical and corporeal tissue entering into the part of the uterus below the ridge, the specimen does not lend itself to investigation. Most of the authorities on frozen section work, including Varnier, Hart and Barbour, are in agreement that freezing *en masse* in this coarse manner obscures histological distinction between decidua and cervical mucosa, since both these lining membranes are almost entirely disintegrated in the course of preparation in the freezing mixture. No attempt has been made to investigate the specimen, therefore, from this point of view, especially as the inner lining of the lower uterine segment is practically the muscle wall, no trace of decidua and mucosa being left.

The contraction ring as first described by Braune had a fixed anatomical relation, namely the level anteriorly of firm peritoneal attachment. Another point marking its site was the constant presence of a large uterine sinus running horizonally.

As regards the first point, the peritoneal attachment, the specimen shows this level to be a line running with its convexity slightly downwards from round ligament to round ligament. During the operation the peritoneum was not artificially dissected off the uterine wall, but the plane of cleavage was commenced by a superficial incision with the scalpel and completed with the finger tips and swabs. This line is seen to be approximately horizontal, while many authors have called attention to the obliquity of the contraction ring felt clinically. Clearly, then, in this specimen there is no relation between peritoneal reflection and the contraction ring.

Most frequently the contraction ring has presented its most characteristic obliquity in the case of a transverse fœtal "lie," and this is easily understood if the asymmetry of such a uterus be considered. With reference to the second anatomical site of the ring (quoted above), namely, at the level of a large uterine sinus, the present specimen does not show its existence, though several of Braune's diagrams have it well marked on the posterior wall. It must be obvious that no large venous sinus can be present in the thin retracted lower uterine segment, but on proceeding upwards along the wall venous sinuses will first be encountered where the thick uterine wall is reached. Only in this sense can a venous sinus mark the limit between the upper and lower uterine segment, and this, perhaps, as the specimen shows, is what Braune would have conveyed.

A consideration of these points would lead us to modify the historic view of the contraction ring, which explains its site purely by reference to the musculature of the uterus and certain anatomical relations therein, and, without taking into consideration the disposition of fœtal parts, conveys the impression that the uterine muscle can, without any *point d'appui*, suddenly undergo such a sharp transition in bulk as to present the clinical sign of a contraction ring. This specimen suggests that its causation is dependent entirely on the position and relation of fœtal parts occupying the lower uterine pole and that by firm and rigid moulding the ring is formed.

The actual ring itself would appear to be due to a contraction of the circular fibres fitting tightly into a groove, as all specimens show that there is no sudden change of thickness.

On comparing the inner surface of the uterus with the fœtal parts occupying it, it will be seen that the oblique ridge or retraction corresponds accurately to the groove between the fœtal thorax and the flexed thigh. Retraction has withdrawn the upper uterine segment entirely off the fœtal thorax and part of the abdomen (which obstetric manipulations have considerably reduced) and has then encountered the additional bulk of the flexed thigh, while the circular fibres of the uterus have tightly gripped the fœtus in the groove between thigh and belly and rendered advance impossible. In criticism of this explanation of tight gripping by circular muscle fibres of fœtal parts along a groove, it would be interesting to ask if any Fellows have observed a well-marked contraction ring in cases where the smooth back of the fœtus has been in approximation to the anterior uterine wall as in a first or second sacral presentation, where no groove of fœtal parts would be present.

In a case of brow presentation, with the head completely disengaged, where a contraction ring was marked on admission to hospital, palpation suggested that retraction had proceeded over the head and had encountered the additional bulk of the shoulders. Spasm of circular fibres at the level of the base of the cervical spine had then produced the clinical sign of an oblique ring, felt through the parietes below the level of the shoulders. The thoracic and abdominal cavities are seen to have collapsed after removal of their contents.

From an examination of the specimen one would think that only a slight amount of traction would have been necessary to effect delivery.

Did the ridge of uterine wall fitting into the fœtal groove act as an actual mechanical obstruction to delivery, holding the contents of the upper part of the uterine cavity as in a vice?

POST-MATURITY OF THE FŒTUS WITH EXCESSIVE DEVELOPMENT.

Evidence of post-maturity of the fœtus rests upon several grounds:—

(1) Calculation of duration of pregnancy from the last menstruation.

(2) Excessive weight of the fœtus.

(3) A determination of the degree of ossification of the fœtus by direct examination of the cartilaginous epiphyses or by radioscopy.

The first two means of information are fallacious when considered by themselves, the degree of ossification being probably the only accurate means of investigation we have at our disposal. Since radioscopy has been applied to the fœtus at birth much light has been thrown on such conditions as "superfœtation," and, indeed, it is questionable whether such a condition actually can exist inside a single normal uterine cavity. Till investigation of ossification was undertaken a notable difference in weight between binovular twins was held to be a proof of superfœtation, but that the condition can be readily disproved by radioscopy is recorded in the *Bulletin de la Société d'Obstetrique de Paris*, 1906, ix., p. 6.

In the fœtus in question to-night, as a result of obstetric manipulations, only one epiphysis is available for observation, that at the upper end of the tibia. It is well marked, and may be accepted on the authority of Keith as proof that the child has reached the forty-fourth week. The subject has been referred to by many authors of text-books, and amongst the general conditions associated with it have been quoted:

(1) *Age of Female Parent.*—Between 25 and 35 years being associated with the largest offspring.

(2) *Parity.*—This factor, however, only acting within certain limits; it is generally held that there is on an average a progressive increase in fœtal weight up to the fifth pregnancy.

(3) The very indefinite relation of the size and general development of the parents.

Its frequency has been discussed by Hirst, who places it at 2 per cent. of all pregnancies, and lays down the general principle that no woman should be allowed to exceed the normal period of pregnancy by more than two weeks. Winckel collected over 200 cases, and Olshausen has also carefully investigated recorded cases, and quotes a case of Bensinger's which, in his opinion, is the only satisfactory proved case. In more recent years Ballantyne and McKerron have put cases of post-maturity on record, and they are apparently the only British authors who have suggested that the explanation may possibly be sought for and found in the placenta. McKerron[1] records a most instructive case of dystocia due to excessive development, and the same author, at a more distant date,[2] describes two cases. In one, gestation was prolonged three weeks beyond full time, rendering evisceration of the thorax and belly necessary before delivery was possible through a pelvis which showed no evidence of contraction. Much of the fœtal bulk was due to an œdematous condition of the subcutaneous tissues, and the explanation is advanced that this may be due to excessive thrombotic placental changes interfering with the fœtal circulation, and thereby causing anasarca and death of the fœtus. This was, however, only a suggestion and was not confirmed by a placental research. Ballantyne[3] describes the only case of post-maturity where the placenta was submitted to microscopical examination, and holds that the placental degenerative changes were in excess of the normal.

Now an investigation of sections of many normal full-time placentæ, carried out on the lines laid down by Eden,[4] shows us that on the several points of endarteritis of terminal arteries, the reticulum of the villus, its epithelial covering and the size and extent of areas of infarction, there is the greatest variation. Ballantyne also emphasizes excessive degeneration by the fact that in his case the intima of one umbilical artery in the cord had nearly obliterated its lumen. But sections of normal full-time cords show only a single artery comparatively frequently, and this single artery not increased beyond the normal in size, so that this point cannot be accepted as a marked evidence of excessive degeneration.

It is a point of some interest that in several (though not in all) of the four protracted gestations occurring in one patient recorded by Ballantyne (loc. cit.) the mother had been taking potassium chlorate in doses of 20 gr. to 40 gr. daily throughout the pregnancy. This had been prescribed with a view to combat a tendency to miscarriage, which had occurred twice. The purely empirical treatment was first introduced by Sir James Simpson in cases of "habitual death *in utero*" of the fœtus. Now Eden (loc. cit.) states: "In many cases of intra-uterine death during the last month of pregnancy the only placental change observed is an extreme 'senility'; possibly normal changes have been overstepped and normal changes have become pathological." If this be so the beneficial action of potassium chlorate in many of these cases must clearly be exerted in the direction of delaying the degenerative changes which set in prematurely.

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[1] *Obstet. Journ. Brit. Empire*, 1907, xi., p. 397.

[2] *Scot. Med. and Surg. Journ.*, 1900, vii., p. 522.

[3] *Obstet. Journ. Brit. Empire*, 1902, ii., p. 521.

[4] "The Ripe Placenta," *Journ. of Path.*, 1896, iv., p. 265.

It will be conceded that such cases of "premature death *in utero*" are the exact converse of the class of case we are discussing to-night, and if we accept Eden's explanation of "premature death *in utero*" the post-mature fœtus owes its causation to delay of the ordinary physiological degenerative changes.

Our own sections exhibited to-night, with a normal placenta for comparison, show no evidence of abnormal placental degeneration in either direction, premature or delayed, and from the examination of many normal full-time placentæ we do not think Ballantyne's case sufficient evidence of excessive placental degeneration.

We still remain in ignorance of the cause or many interacting causes that determine the onset of labour, but all the evidence at our disposal points to the fact that labour will set in at such a time as the placenta becomes inadequate to maintain the nutrition of the fœtus.

May it not be possible, and indeed more than probable, that no essential difference should exist between the normal placenta and its post-mature fellow, since the degenerative changes which determine the onset of normal full-time labour in the former case will in the latter be delayed, and will bring on labour only when they have approximated to those of the normal full-time placenta?

DISCUSSION.

Dr. CHAMPNEYS had been unable to hear all that Dr. Maxwell had read, but as he appealed to those present with reference to the locality of contraction rings he would say that he had felt these in various parts of the uterus, in some cases (as in varieties of hour-glass contraction round a placenta) round one of the uterine cornua. As regarded the question of treatment, the experiments of Kleinwächter showed that spontaneous delivery occurred in some of the most unpromising cases of labour obstructed from impaction. In such a case as that under discussion, where the patient was already septic, the choice was one of great difficulty, and he could not say that the choice had been wrong, though the case ended fatally.

Dr. W. S. A. GRIFFITH suggested that the probable cause of the difficulty in delivery was not in the uterus but in the macerated condition of the fœtus preventing any secure hold being obtained. He wished to emphasise the great value of version as a means of delivery after craniotomy. Every student had to be taught two methods of dealing with obstetric difficulties—those in which he was surrounded by skilled assistants and the best appliances, and others in circumstances where he had nothing to rely on but wits and his fingers. The ease and safety with which delivery can be effected under the latter circumstances made Dr. Griffith advise it as usually the best method in all cases, with, of course, the obvious exception of those of tonic uterine contraction. The ridges which are found in frozen sections of the uterus and its contents must not be taken as necessarily indicating that of conditions present before the death of the patient. They were often due to pressure and the freezing process after death.

Dr. HERMAN said the only case that in his experience was comparable to the case related by Dr. Andrews and Dr. Maxwell was one admitted into the London Hospital after a medical man outside had divided the neck and removed the child's body, leaving the head *in utero*. The os uteri had contracted. Dr. Herman tried without success to extract the head. Treatment was therefore limited to antiseptic douches, and after many days the head was spontaneously expelled.

Dr. EDEN remarked that the term "contraction ring," used by the authors in their paper, was inaccurate—it should be called the "retraction ring," for it was produced not by contraction but by retraction. He could not accept the view advanced by them as to the mode of formation of this ring, and thought that the authors had overlooked the fact that there is a retraction ring formed in normal labour, when a thin layer of liquor amnii still remains between the uterine wall and the body of the fœtus. It could not, therefore, be solely the result of moulding upon a body groove. He thought the clinical history of the case was very instructive, and asked whether it would not have been better, when tonic contraction set in, to have administered a full dose of morphia and waited for a few hours to allow the tetanus to pass off. Tonic contraction was practically always due, as in this case, to the irritation caused by prolonged intra-uterine manipulations, and would not subside while such manipulations were continued.

The PRESIDENT (Dr. Herbert Spencer) expressed his sympathy with Dr. Russell Andrews in the anxious and arduous case recorded. He thought that at the present time, when dystocia was so frequently dealt with by abdominal section, it was not inopportune to advise a course of reading of the old obstetrical writers, for whom abdominal section was not available and who had to rely on their hands and on hooks and crotchets to effect delivery. Smellie especially was valuable for the advice he gave in these cases, and the arduous nature of some of his deliveries might be judged from his statement that he was sometimes so exhausted thereby as to have to take to his bed. Dystocia due to the fœtus was very inadequately treated in modern text-books. The history and use of the crotchet was evidently not generally taught to students at the present day. Almost always students stated in examinations that it was designed for the purpose of breaking up the brain—a purpose for which it was entirely unnecessary and not very suitable. It was on the crotchet, and especially on *two* crotchets, applied outside the child's body at opposite sides, that Smellie chiefly relied for delivery in these cases. Both the crotchet and the formidable double hook of Ambroise Paré were not free from danger, but carefully used they were much less dangerous than abdominal section. It was certainly a very painful resource to have to perform hysterectomy or Cæsarean section for the delivery of a dead and mutilated child, and though he did not criticise the present case he thought such operations would only very rarely indeed be necessary. He had pointed out, many years ago, the value of division of the clavicles and of the spine, with the subsequent application of Braxton Hicks's cephalotribe, in certain cases of dystocia due to the fœtus. The difficulty in the present case was evidently owing to the want of a sufficient hold for traction after the head had been removed. He ventured to suggest that delivery might possibly have been effected either by the application of Braxton Hicks's cephalotribe to the trunk, by the application of two crotchets in Smellie's method, or by the use of vaginal retractors and removal of the child piecemeal, as in the case of a fibroid.

Dr. ANDREWS, in reply, thanked the speakers for the sympathetic tone which had characterised their remarks. He had used the cephalotribe, craniotomy forceps, sharp and blunt hooks, crotchet, vertebral hook, and several pairs of bone-forceps, lion-forceps and bullet-forceps ; but even when he thought that he had obtained a good hold with two or three instruments at once they had all torn through the fœtal tissues or brought only small fragments away. He had not felt justified in putting the woman back to bed with a septic fœtus still inside the uterus, which organ was in a state of tonic contraction, although he realised that hysterectomy was attended with great risk. He pointed out that we do not know much about the reality of the danger of leaving such a patient alone with the uterus in a state of tonic contraction, since modern obstetrical methods never allow this condition to remain long enough to enable us to study the results of spontaneous expulsive efforts.

Dr. MAXWELL, in answer to Dr. Eden's criticism of the expression "contraction ring," acknowledged that the expression "retraction ring" was the more correct term, but he had been influenced by the present specimen in emphasizing "contraction," since he thought the "ring" had been produced chiefly by the spasm of circular muscular fibres at the groove in the fœtal tissues, and not wholly by the retraction of longitudinal muscle fibres. Dr. Eden had referred to a frozen section described by Hart and Barbour, where there was a well-marked retraction ring in a uterus, though the uterine wall was separated from the fœtal tissues by a layer of liquor amnii. At first sight this would apparently disprove any relation between the site of the ring and the fœtal parts underlying it. But the case quoted was one of normal labour and could hardly be compared with the case in point. In any case Dr. Maxwell found it hard to conceive on physical grounds how a sheet of muscle could so contract as to form a sharp ridge on its surface without taking into consideration the influence the underlying fœtal parts exerted in its formation. The value of the evidence of post-maturity, based on the presence of the upper tibial epiphysis, had been criticised, but Dr. Maxwell still thought that its presence, and especially its large size (nearly $\frac{1}{3}$ in. in length), was ample proof of post-maturity.

Uterine Fibroids showing Sarcomatous Degeneration.

By W. C. Swayne, M.D.

(1) Multipara, aged 57, complained of an abdominal tumour with, three years after the menopause, irregular hæmorrhage steadily increasing, accompanied by rapid growth of the tumour. A diagnosis was made of uterine fibroid undergoing degeneration, probably malignant in nature.

Laparotomy was performed and the tumour shown was removed by panhysterectomy. On section, the upper part of the tumour resembled fibro-myoma, while the lower part consisted of large cavities filled with blood and soft debris.

Extract from Report by Dr. Walker Hall (July 4, 1907).—"Microscopically the main mass of the growth consisted of fibromatous tissue only. The soft material was composed of fibrous tissue undergoing degenerative changes of a sarcomatous type."

The patient made good progress for ten days after operation, and then died comparatively suddenly of heart failure. At the autopsy numerous metastases were found in the lungs, liver and glands.

Report of Pathology Committee.—"We have examined this specimen and microscopic sections prepared from it by Mr. Eastes, and agree with the exhibitor that the growth is a fibro-myoma undergoing sarcomatous change."

(2) Multipara, aged 47, complained of "falling of the womb" and irregular hæmorrhage. A large soft tumour was felt projecting into the posterior wall of the vagina, and extending upwards to well above the pelvic brim. A provisional diagnosis of myxoma was made and the tumour and the uterus removed by panhysterectomy.

The patient never seemed to make any attempt at repair; on removing the stitches from the abdomen on the tenth day the whole of the abdominal wound broke down and the intestines were exposed; it was closed, but no attempt at union was made.

The patient died five weeks after operation without any definite symptoms having developed, nothing being found post mortem to account for death.

Extract from Report by Dr. Walker Hall.—"Sections of the mass taken from several places show areas of fibroid undergoing degeneration, with patches in which sarcomatous changes are evident."

Report of Pathology Committee.—"We have examined this specimen and the microscopic sections prepared from it by Mr. Eastes, and agree with the exhibitor that it is a fibro-myoma undergoing sarcomatous change."

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) was glad to see that Dr. Swayne performed total abdominal hysterectomy. It was the presence of sarcoma in two tumours he had removed by supravaginal hysterectomy which, amongst other reasons, led Dr. Spencer to abandon the partial operation. Both the patients died from recurrence. It was advisable that these tumours should be carefully examined microscopically and the after-history obtained when possible. The section of one of Dr. Swayne's cases under the microscope was not sufficiently thin to enable an opinion to be formed on the microscopic structure of the tumour. He hoped the author would have fresh sections cut and refer the specimen to the Pathology Committee for report.

Dr. AMAND ROUTH asked if paroxysmal pain coming on at a fixed hour daily had been noticed in the cases reported. He had observed this symptom in two of his own and in other reported cases. He asked whether Dr. Swayne's cases were instances of sarcomatous degeneration of fibro-myomatous tissue or was there a *de novo* growth of true sarcoma?

Dr. CUTHBERT LOCKYER said he welcomed the President's suggestion that the specimens be referred to the Pathology Committee, as from viewing the slides which were under the microscopes Dr. Lockyer was by no means certain that the growths showed evidence of sarcoma; he hoped Dr. Swayne would provide the Pathology Committee with thinner sections than those shown, one of which, as far as could be judged, showed no signs of sarcoma, whilst the other, to say the least, was doubtful.

Dr. MACNAUGHTON-JONES said, with regard to pain, that this to a great extent depended upon the nature and situation of the growth. If it be interstitial and parenchymatous it was more periodical and severe, not so if it be of the submucous type (as noticed by Simpson).

Dr. SWAYNE, in reply, said that he considered the first specimen showed the advantage of panhysterectomy over the subtotal operation: the latter would probably have left infected tissue behind.

Dr. SWAYNE also showed three specimens of tubal gestation removed by him:—

(1) Specimen showing tubal abortion: the ovum half extruded from the dilated fimbriated extremity of the tube. The ovum, when opened, was found to contain an embryo 7 mm. in length.

(2) Specimen of an unruptured tubal gestation, showing hæmorrhage into the gestation sac.

(3) Sections of tubal mole, with considerable dilatation of tube.

Dr. SWAYNE remarked that, with regard to the first specimen, it appeared that the ovum in this case might have escaped completely and undergone further development as an abdominal extra-uterine pregnancy.

(4) Two microscopic sections taken from uterus of a multipara, aged 69, removed by vaginal hysterectomy on account of hæmorrhage, proved to be due to malignant disease, by curetting, showing carcinoma with degenerated areas showing cells of sarcomatous type.

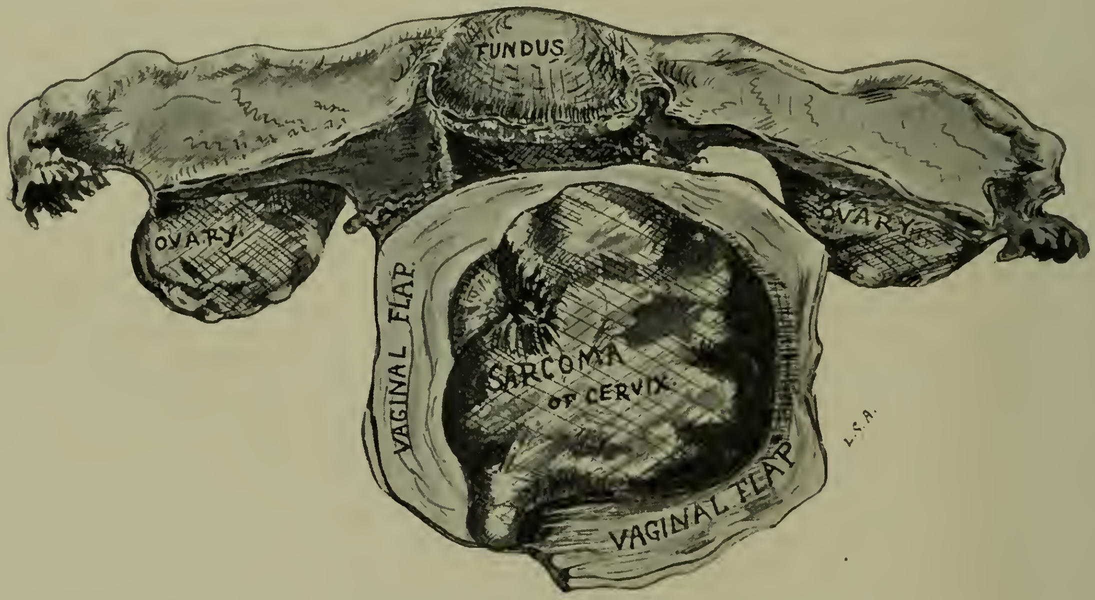
Dr. CUTHBERT LOCKYER thought it quite unnecessary to submit the section to the Pathology Committee, as it appeared to be a straightforward case of epithelioma cervicis, having no special interest as regards its histological peculiarities. These growths, and those of the body of the uterus, frequently showed cell changes, which went to prove that uterine cancer does not always breed true in its cell formation. The term metaplasia was the best one to cover the change of type which epithelial cells underwent, whereas to speak of "sarcomatous change in cancer cells" was a contradiction of terms.

Report of the Pathology Committee.—"The examination of the sections of a carcinoma of the uterus undergoing sarcomatous changes was deferred."

Sarcoma of the Cervix.

By LOUISA GARRETT ANDERSON, M.D.

MISS ANDERSON showed a specimen consisting of the upper part of the vagina, the uterus and the appendages, which had been removed by abdominal hysterectomy from a patient, aged 16. At the end of December, 1907, the patient, E. G., presented herself at the out-patient department of the New Hospital for Women. She complained of vaginal discharge which had troubled her for a year, although it had become offensive and much more profuse during the last few weeks. The girl looked ill and was very anæmic, but there was nothing in her history to suggest the serious nature of the disease. She had had no pain, and menstruation had been perfectly regular from the time of commencement at the age of 13. Pelvic examination showed that the vagina was filled by a mass of growth, which bled freely and which was obviously malignant. The patient was at once admitted to the hospital, and, owing to the temporary absence of Miss Aldrich Blake, she came under the care of Miss Anderson. On December 20 she was examined under an anæsthetic. The growth consisted of soft, solid, irregular polypoid masses, pinkish grey in colour. There was no cystic degeneration, and, considering the size of the growth, extremely little necrosis. The vagina was ballooned and the cervix was carried so far out of reach that, even with the help of the anæsthetic, it was difficult to make out the anatomical relation of the parts. The growth sprang from the posterior and left margins of the cervix. The greater part of the tumour was curetted away, the tissues removed weighing 1 lb., and the hæmorrhage, which was free, was checked by the cautery. Sections of the growth showed the structure of mixed-cell sarcoma. On December 31 abdominal hysterectomy was performed, the patient making a good recovery, and, when seen two months later, the improvement in her general appearance was striking, and the condition of the vaginal scar was satisfactory. The exhibitor commented on the rarity of sarcoma of the cervix. In the New Hospital for Women only one other case had occurred during the last fifteen years. This patient had been under the care of Mrs. Boyd in 1897, when vaginal hysterectomy had been performed. The rarity of sarcoma of the cervix was in contrast to the frequency of cancer of the cervix. Sarcoma of the fundus uteri, although rare, was less rare than sarcoma of the cervix, and several cases, probably



Sarcoma of cervix, springing from left side and posterior lip. The greater part of the growth was removed by a preliminary scraping.

six or seven, although the exact number could not be quoted, had been treated in the hospital during this period.

In conclusion, Miss Anderson expressed her acknowledgment to Miss Aldrich Blake for her kindness in lending her the bed and for her help at the operation.

DISCUSSION.

Mrs. BOYD said the case referred to by Miss Anderson was under her care in 1896. She was a woman, aged 39, who had been told by a doctor a year previously that she had cancer of the womb, but as symptoms were not present she did not trouble. Three months before admission irregular hæmorrhages appeared. She was admitted during the holiday months (in August) to the New Hospital for Women, under Miss Aldrich Blake, who removed a large cauliflower-like growth springing from the cervix, filling the vagina, and invading somewhat into the right fornix, but not involving bladder or rectum. The growth extended too high up the cervix for amputation of the cervix to hold out any hope of cure, so vaginal hysterectomy was proposed but refused by the patient at that time on account of illness in her family. She was readmitted in October, and Mrs. Boyd removed the uterus by the vaginal route. There was no definite recurrence, but much of the cervix was wanting, and tissue resembling granulation tissue occupied the site of the growth on the posterior right aspects of the cervix. Sections cut of cervix, and also of fundus, showed the same "muscular" tissue and no epithelial growth. Early in 1898, within six months of the operation, the patient was seen by Miss Aldrich Blake as an out-patient, with a large mass growing from the sacrum and obstructing the rectum. This rapid recurrence supported the view that it was a sarcomatous growth.

The PRESIDENT (Dr. Herbert Spencer) remarked on the great rarity of sarcoma of the cervix, of which, personally, he had not met with an example. He hoped that Dr. Garrett Anderson would furnish a full account of the microscopic appearances and would illustrate the account with drawings.

Report of Pathology Committee.—"We have examined this specimen and the microscopic sections taken from it, and agree with the exhibitor that the growth is a mixed-celled sarcoma."

Carcinoma invading a Myoma.

By H. MACNAUGHTON-JONES, M.D.

THE patient from whom the specimen was taken was aged 58. She was married for thirty-one years and had never conceived. She had suffered from "floodings" for years. These ceased for a time at the menopause, when aged 49, but recurred, and of late years the drain was constant. These had reduced her strength, and she came to me in a general cachectic condition. A myoma had been discovered years before. She refused operation and only with difficulty could an examination be obtained. Her medical adviser, suspecting that the tumour might have assumed a malignant type, wished for a decision, and it was arranged for an examination under anæsthesia so that the question of operation should be settled. At the same time it was hoped that the application of a styptic might mitigate the bleeding. The tumour was found to reach to near the umbilicus. The cervix and os were quite normal in appearance, but fibromatous to the feel; the sound was arrested above the isthmus. With a small spoon curette I broke down some of the hard growth, which completely filled the cavity of the uterus, the section shown being taken from a distance of from 6 in. to 7 in. from the os. There was free bleeding, which was arrested by plugging and the application of adrenalin. The case was clearly inoperable. She had no hæmorrhage and returned home in a few days. She died about one month after leaving. While I have had cases of carcinoma associated with myoma, one interesting instance of which I have brought to show to the Fellows, this is the first case in which it to all appearances appeared to be a simple myoma, though accidentally it was found that the muscular structure of the fundus was invaded by carcinoma.

Mr. Sampson Handley and Mr. Shattock have kindly examined the section and pronounced the growth to be "carcinoma invading the muscular tissue." No post-mortem could be obtained.

Report of Pathology Committee.—"We have examined the microscopic sections taken from this specimen and agree with the exhibitor as to the coexistence of myoma and carcinoma."

Sarcomatous Ovarian Tumour (Perithelioma) coexisting with Carcinoma of the Uterus (Ovariotomy; Panhysterectomy).[1]

By Arthur H. N. Lewers, M.D.

The patient from whom the specimen shown was removed was a married woman, aged 43. She was admitted into the London Hospital on October 29, 1907. She had had four children, the last thirteen years previously, but had had no miscarriages. The symptom which caused her to seek advice was retention of urine, which occurred the day before her admission to the hospital. There was a history of menorrhagia since October, 1906. This had been better since March, 1907, when a polypus was said to have been "burnt away with caustic." Up till 1905 menstruation had been regular every twenty-eight days, the period lasting four days. From October, 1906, to March, 1907, the periods occurred every two or three weeks, the loss being profuse and lasting eight days. From March, 1907, to October, 1907, menstruation occurred every twenty-eight days, and the loss lasted six days. She had also suffered from dysmenorrhœa, which was not relieved by the flow. The pain was described as "bearing down" in character.

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[1] Shown on December 12, 1907.

There had been no inter-menstrual loss of blood at all. She was closely questioned on this point and was quite certain about it.

On examination of the abdomen a hard swelling was felt in the hypogastric region, reaching up to within 1½ in. of the umbilicus.

On vaginal examination a somewhat elastic fixed tumour was felt through the posterior fornix. The cervix was very high up, about level with the upper border of the pubes. The hard swelling described as felt in the lower abdomen was found to be the body of the uterus, raised up by the pelvic tumour described, and separate from it. The sound passed 3 in., causing some bleeding.

Operation, October 31, 1907.—On opening the abdomen the tumour described was found to be an ovarian tumour. It was fixed in the pelvis by inflammatory adhesions to the rectum or sigmoid flexure. These were easily separated. It was also adherent to the back of the body of the uterus and left broad ligament, and, on separating this attachment, it was obvious that the area from which the tumour had been detached was infiltrated by new growth. It was therefore decided to remove the body of the uterus. This was done in the usual way. When the cervix was cut through at about the level of the internal os a mass of malignant growth came into view. The remainder of the cervix was therefore removed. A gauze drain was pulled down into the vagina, and the peritoneum was sewn together over it. The abdominal wound was completely closed. The patient made a good recovery and left the hospital on November 27.

Remarks.—Portions of the ovarian tumour and of the uterine growth was sent for examination to the Clinical Research Association, and Mr. Targett's report was as follows: "We cannot give a definite opinion on these specimens without the knowledge of their relationship to one another, for the obvious structure of the ovarian tumour is sarcoma, while that of the uterus is columnar-celled carcinoma. The structure of the latter (uterine) is quite definite, and at one end of the section the tubular arrangement of the columnar cells is very distinct. But the ovarian growth is complicated by the presence of clumps of epithelial cells, which are becoming horny in the centre. We think that the other parts of the ovarian tumour should be examined, as it may prove to be a composite growth after the manner of a malignant embryoma."

With reference to the clinical aspects of the case, Dr. Lewers remarked on the comparative rarity of retention of urine as a symptom of ovarian tumour. The absence of metrorrhagia was also a curious feature; in fact, the cancer of the uterus was not diagnosed till the growth came into view in the course of performing hysterectomy. There had been really nothing in the history or physical signs to point to it.

Report of Pathology Committee.—"We have examined this specimen and microscopic sections taken from it, and agree that the uterine growth is a columnar-celled carcinoma of the cervix commencing to invade the body. The ovarian growth is a sarcoma of a peritheliomatous nature, and the two epithelioid masses embedded in the stroma of the tumour are endothelial in character. We are confirmed in this view by finding transitional forms of cells of similar character in the stroma of the growth, and are of opinion that by a process of inhibition the cells have become swollen and assumed an appearance simulating epithelial cells. The committee have had the advantage of Dr. F. W. Andrewes's confirmatory report upon this specimen."

Tumour of Fœtal Head.[1]

By Harold S. Sington.

(Introduced by Dr. Handfield-Jones.)

Mrs. T., a secundipara, aged 31, was admitted to the British Lying-in Hospital, under Dr. Handfield-Jones, on November 11, 1907. Her previous child, a breech presentation, was born dead; no details obtained. No family history of deformities. Abdominal examination showed a cephalic lie, the child's back to the mother's left front in an attitude of flexion. The fœtal heart sounds, best heard below and to the left side of the umbilicus, were 150 to the minute.

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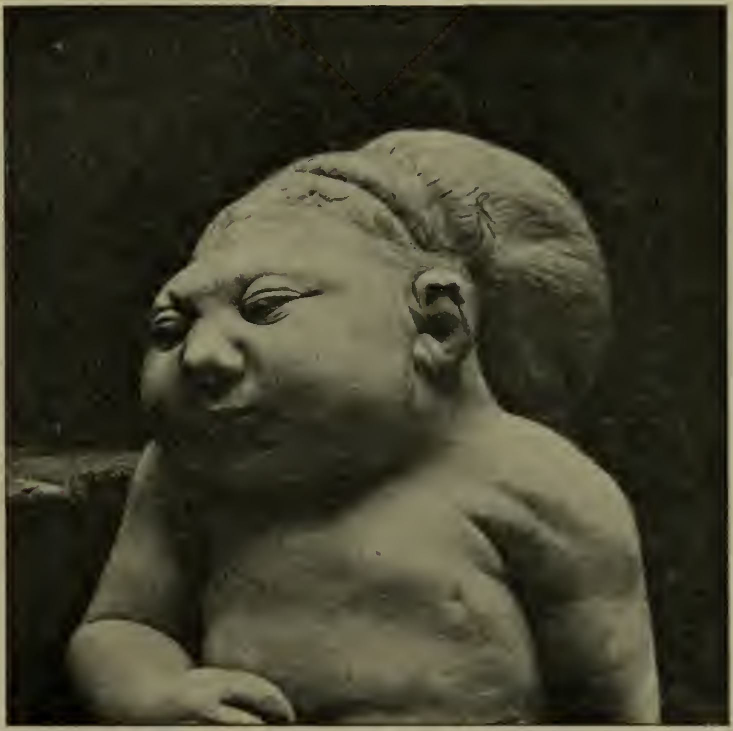
[1] Shown on January 9, 1908.

Per vaginam the cervix was nearly fully dilated and the membranes ruptured during examination. The finger then came on a tense rounded "bag," which felt like another bag of membranes. Further examination revealed the face in the usual situation for a first vertex presentation, but no parietal or occipital bones could be distinguished. A meningocele was diagnosed. By means of a Sims's speculum a view of the presenting part was obtained and found to be covered with hair. The head descended gradually and the tumour was born first, the face, gliding over the perineum, rotated to the right. The second stage of labour occupied half an hour. The placenta was expelled naturally.



Encephalocele through the posterior fontanelle.

The child was born alive and sent to the Hospital for Sick Children, Great Ormond Street, but only lived seven hours. It was a female, weighing 7 lb. 2 oz., and was 20 in. long. The face was of the anencephalic type. The frontal bone was intact, but the parietal and occipital bones could not be felt, the tumour occupying the posterior part of the head. The vertical circumference of the tumour was 13 in. and the horizontal circumference through the glabella 18½ in. No other deformities were found.

A radiograph was taken by Dr. W. Ironside Bruce, who reports that a trace of the parietal bones can be seen and that the cervical vertebræ are intact.

I am indebted to Dr. M. Handfield-Jones for permission to report this case and for introducing me to the Society; also to Dr. Reginald Miller for the photograph of the specimen.

Pathological Report by Dr. Reginald Miller.—"The tumour contains cerebrospinal fluid, and the wall consists of brain substance covered by the membranes and skin. There are no bones over the posterior part of the tumour, the parietal bones being confined to the anterior aspect. The base of the skull is normal. The tumour is therefore an *encephalocele through the posterior fontanelle*, the enlargement of which has caused the parietal bones to be flattened over the anterior part."

The PRESIDENT (Dr. Herbert Spencer) thought that these cases of meningocele were rare; he had only seen four or five. In one the meningocele occurred in the frontal region and hung over the child's face; the others had occupied the occipital region and came through a hole in the bone, which was not the posterior fontanelle. He asked whether the aperture of exit had been investigated in the case exhibited. These posterior meningoceles were sometimes a cause of face presentation.

Obstetrical and Gynæcological Section.

April 9, 1908.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

A Case of Intra-uterine Death of the Fœtus occurring in Six Consecutive Pregnancies, with Observations upon the Importance of the Examination of the Fœtal Tissues for the Presence of the *Spirochæta pallida.*

By HERBERT WILLIAMSON, M.B., and EARDLEY L. HOLLAND, M.D.

THE pathology of ante-natal death is obscure and has been but little investigated. Syphilis is justly regarded as one of the commonest causes, and the following case demonstrates that even in the absence of a history of infection or of any clinical manifestations of the disease in the parents syphilis may be responsible for the death of the child.

A. B., aged 24, was first seen by Dr. Williamson on November 23, 1903. She came to the Royal Waterloo Hospital because she had given birth to two stillborn children, and, believing herself to be pregnant again, wished to know if anything could be done to prevent a similar mishap.

Menstruation commenced at 17, and occurred regularly every twenty-eight days until the time of her marriage. She was always a healthy girl, and was one of a family of five; her brothers and sisters are all married and all have living children. She married at the age of 23, and two months later became pregnant. After twenty-six weeks gestation she was delivered of a stillborn child. Six months later she again became pregnant, and again gave birth to a dead child at the end of the twenty-eighth week.

Dr. Williamson saw her five months after this event; on examination he found she was three months pregnant, but could discover no abnormal condition in the pelvis and no signs of any general disease. The question of syphilitic infection was carefully inquired into, but with an absolutely negative result. Neither she nor her husband had ever followed any injurious occupation. The cause of the death of the fœtus therefore remained a mystery. She was treated with small doses of chlorate of potash, and was lost sight of for nearly two years.

In July, 1905, she again presented herself at the Waterloo Hospital. She stated that she had been delivered of a dead child at the end of eight lunar months gestation in 1904, and of another dead child at the end of nine lunar months gestation in March, 1905; in her last pregnancy she had felt fœtal movements a few days before delivery. There had been no return of menstruation since the birth of the last child.

On examination she was found to be two months pregnant. Nothing more was seen of her until June, 1906, when she returned to the hospital and told us that she had been delivered of a dead child after nine months gestation; she was not certain when she last felt fœtal movements. She was once more pregnant, and Dr. Williamson impressed upon her the importance of allowing us to keep her under observation, and to induce labour at about the thirty-second week. He saw her on September 2, and from the size of the uterus thought she was then in the thirtieth week of pregnancy; fœtal movements were felt and the fœtal heart was heard. He recommended her for admission to Queen Charlotte's Hospital with a view to induction of labour. She was admitted on September 21 and was found to be in labour. The child was stillborn. It presented by the breech and was macerated.

The post-mortem notes state that the child was premature, presumably of about thirty-six weeks gestation, macerated but not foul smelling. It presented no signs of syphilis. The spleen was enlarged. The centre of ossification of the lower epiphysis of the femur had not appeared. Unfortunately the placenta had been destroyed and was not available for examination. Dr. Holland, working with the silver method, examined sections of the liver, the spleen and the umbilical cord for the presence of the *Spirochæta pallida*. He recorded his results as follows: "Liver: spirochætes are distributed throughout the whole section more or less uniformly, but in certain small areas are grouped very closely together. Whether these areas correspond to the site of blood-vessels it is difficult to say, for the method employed does not admit of clear differentiation of the tissues. In the midst of some of these areas, however, the presence of red blood-corpuscles lying in small spaces affords evidence in support of this supposition. The organisms are not intracellular, but lie between the cells in the connective tissue or lymph spaces.

The spirochætes themselves have been cut at different planes and angles. Some are typical, with as many as fifteen or twenty spirals, others are shorter, whilst some have evidently been cut at the summit of the curves and appear as a series of dots. The apparent grouping of the spirochætes around the blood-vessels of the liver does not justify us in assuming that the infection is primarily placental and reaches the fœtus through the umbilical vessels. It must be remembered that all the blood of the fœtal circulation passes through the liver, and the presence of spirochætes in or around the hepatic capillaries is not surprising. Spleen: the sections show spirochætes in the same abundance as those of the liver, but they are distributed more uniformly, and there are no 'clumps' as in the latter organ. Umbilical cord: no spirochætes can be detected in the sections."

The evidence obtained from the study of the dead fœtus appeared to prove conclusively the presence of a syphilitic infection, even in the absence of any clinical manifestations of syphilis and in spite of a negative history. In the light of our new knowledge we investigated the case again. We interviewed and carefully examined the husband, and once more made a thorough examination of the wife; we failed, however, to find any single fact, either in the history or the clinical examination, which we could regard as even suspicious. In the event of a fresh pregnancy we determined to try the effect of a course of treatment by mercury and iodide of potassium. We had not long to wait. In May, 1907, the patient returned to the hospital; she stated that she had seen no periods since the birth of the child, but she believed she was again pregnant. On examination this proved to be true. She was ordered small doses of mercury and iodide of potassium, and this treatment was continued up to the time of the delivery. The stage of gestation could be judged only by the size of the uterus, as we had no menstrual history to help us. When examined on October 17 the uterus reached to the costal margin and the fœtal heart could be heard; she was therefore sent into Queen Charlotte's Hospital with a view to induction of premature labour. On November 1 she was admitted under Dr. Stabb, and on the following day labour was induced by the introduction of two bougies. Sixteen hours later pains commenced, and at 11 p.m. on November 3 she was delivered of living twins, a boy and a girl. The male weighed 3 lb. 11½ oz., the female 3 lb. 3½ oz. Both children were obviously premature, and the amniotic sac of the female child contained a large excess of liquor amnii. It was clear that we had miscalculated the stage of gestation and had induced labour much sooner than we ought to have done.

The female child died on the fifth day and the male child on the ninth day. Post-mortem examinations were made in both cases. In the female child no cause of death beyond prematurity could be discovered. In the male child there was collapse and broncho-pneumonia of both lungs. Neither showed any syphilitic lesion. The liver, spleen, the lungs and the kidneys of the female child were examined by the silver method for the presence of the *Spirochæta pallida.* In none of these organs could it be detected.

The result is disappointing. We were misled by the existence of twin pregnancy and hydramnios into believing that gestation had advanced nearly to full term, and the deaths of the children must be attributed to our unfortunate mistake.

We bring forward this case as a contribution towards the pathology of intra-uterine death. The importance of syphilis as a causal factor has long been recognized, but hitherto we have had to rely upon a history of infection in the parents or upon certain gross lesions exhibited by them or by the dead fœtus; and in the absence of such evidence proof has not been possible. Levaditi's method of demonstrating the *Spirochæta pallida* has given us a new means of diagnosis and new indications for ante-natal treatment, but before the value of these can be established two questions must be discussed: (1) What is the evidence upon which it is claimed that the *Spirochæta pallida* is the specific organism of syphilis? and (2) Is the method of Levaditi a reliable one for demonstrating the presence of the organism?

In March, 1905, Schaudinn [17] discovered in scrapings from an excised primary chancre a distinctive Spirochæta; this he named the *Spirochæta pallida,* because in comparison with other spirochætes it stained only faintly with Giemsa's stain. Further observations revealed to him the fact that this organism was constantly present in cases of primary and secondary syphilis. Later Schaudinn [18], working with Hoffmann, found it in every one of seventy consecutive cases examined. He emphasized the fact that the frequency of its discovery in cases of syphilis depended directly on the skill and experience of the observer, an observation that has been amply confirmed by later workers. As a result of his work Schaudinn claimed that the *Spirochæta pallida* (or, as he named it later, the *Treponema pallida*) was the specific micro-organism of syphilis.

The *Spirochæta pallida* is usually 10 μ to 15 μ in length. It is spiral and contains eight to twelve sharp regular curves. It may sometimes attain a much greater length and contain a correspondingly larger number of curves. It tapers slightly towards the extremities, the curves becoming less steep. It possesses one flagellum at each extremity; it multiplies by longitudinal fission, the initial stage being shown by a doubling of the flagellum at one extremity; there is no undulating membrane. Whether it is a protozoon or a bacterium is not yet quite settled—Schaudinn believed it to be a protozoon. It is stained best in films by Giemsa's stain. The spirochætes belong to a large and widely distributed class of organisms. Schaudinn believed the *Spirochæta pallida* to possess morphological characteristics by which it could be distinguished from other members of the group, but we now know that there exist certain spirochætes which, by the ordinary staining methods, cannot with certainty be distinguished from the pallida. Notable amongst these is the *Spirochæta pertenuis*, described by Castellani [3] as the infective agent in yaws.

The *Spirochæta refringens* is by far the commonest of the class; it is often found in the mouth and most frequently when carious teeth are present. The refringens is a thicker and plumper organism than the pallida; its curves are less numerous, flatter, and irregular in length and form; its ends are often blunt. Other spirochætes have been found in necrotic and ulcerating carcinomata and in balanitis.

Confirmation of Schaudinn's work quickly came from all sides, and soon a vast amount of literature was produced dealing chiefly with the association of the *Spirochæta pallida* with primary and secondary syphilitic lesions, and the evidence adduced plainly demonstrated the constant association of the organism with this disease. Still further proof of the pathogenicity of the *Spirochæta pallida* was given by the result of inoculation experiments in animals. In May, 1905, Metchnikoff and Roux [10] were able to find the organism in the primary lesions of apes inoculated with syphilis, and in November of the same year, as the result of further work [11], they were able to find it in 74 per cent. of the infected animals, both in the primary and secondary lesions. Neisser [13] could not at first find it so often in his infected apes, but later, as the result of increased experience in searching for the organism, was able to find it in a much greater percentage of cases in the primary lesions and secondary eruptions, but was never able to find it in the internal organs.

So far the organism had been demonstrated only in smear preparations, stained best with Giemsa's stain. Attempts to stain it in sections were unsuccessful until Levaditi [7], in 1906, introduced a method of silver nitrate staining. This was essentially a modification of

Ramon y Cajal's method of staining fine nerve fibrils. This is the method we have employed ourselves, and we propose to give a short description of it.

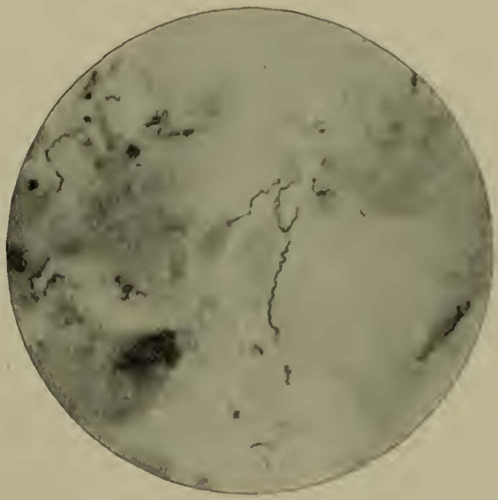
Thin pieces of tissue must be taken. They are first placed in a 5 per cent. solution of formalin in distilled water for twenty-four hours. They are then placed in distilled water until they sink; next they are transferred to 90 per cent. alcohol for twenty-four hours. They are then again rapidly washed and placed in a 1·5 per cent. solution of silver nitrate in distilled water, and kept in an incubator at 37° C. in the dark for five or six days. They are then rapidly washed in distilled water and are developed, still in the dark, for twenty-four hours at the room temperature in the following solution: pyrogallic acid, 2 grm.; formalin, 5 c.c.; distilled water, 100 c.c.

After this they are again washed, hardened in alcohol, cleared in xylol and embedded in paraffin. Thin sections are cut and are mounted for examination. The Spirochætæ are stained black, connective tissue fibres dark brown, and protoplasm dark yellow. The great essentials for success are that scrupulous cleanliness should be observed and that the silvering and development should be carried out in the dark. Levaditi's method especially lends itself to the examination of the organs of syphilitic fœtuses. In addition to the case just recorded we have examined at Queen Charlotte's Hospital the organs of seven macerated fœtuses, and have found the Spirochæta in great abundance in six; of these, in five there was a history of syphilis in the parents; in the single negative case there was no such history. The organs examined were the liver, spleen, kidneys and lungs, and the Spirochæta was present in each case on all these organs, but most abundantly of all in the liver (*see* fig.) and lungs. In the placenta we could never find it. Bab [1], who has examined a large amount of material in very great detail, found the Spirochæta in the various organs in the following proportions: lungs, 87 per cent.; pancreas, 80 per cent.; skin, 66 per cent.; suprarenal, 64 per cent.; spleen, 62 per cent.; liver, 59 per cent.; kidneys, 54 per cent. He found it in the umbilical cord in 9 per cent., but never in the placenta.

The spirochætes lie chiefly between the cells of the organ in the connective tissue. They may lie within the cells. Bab has found them in the ovum; Gierke [5] found them abundantly in the epithelium of the bronchioles, and Levaditi found them within leucocytes. Levaditi [8] and many other observers also found them lying within blood and lymph spaces.

The constant presence of the *Spirochæta pallida* in the organs of congenitally syphilitic fœtuses, and the absence of all other organisms, is a remarkably strong piece of evidence for the specificity of the *Spirochæta pallida* as the infective agent in syphilis.

In 1906 Saling [15], an assistant at the Zoological Institute of Berlin, published a remarkable paper in which he attempted to show that Levaditi's method was utterly worthless for the demonstration of the *Spirochæta pallida*, and that the so-called "silver spirochætes" were not spirochætes at all, but merely fine nerve endings, elastic and other connective tissue fibres. He asserted also that although silver sections of organs of these fœtuses showed swarms of spirochætes, yet if smear preparations of the same organs were taken and stained with Giemsa's stain, no spirochætes could be seen.



Spirochæta pallida in the liver of the first macerated fœtus examined. Section stained by Levaditi's method. × 1,000 diameters. (Micro-photograph taken by Dr. Hurry, Bacteriological Laboratory, King's College.)

To exclude any possibility of syphilis in the material used, he took pieces of tissue from the organs of various animals, including bears, pigs, monkeys, guinea-pigs, and rabbits. In sections from lungs, liver, blood-vessels and other organs, stained by Levaditi's method, he demonstrated fine spirals which sometimes resembled in appearance the *Spirochæta pallida*. He supposed that these nerve and connective tissue fibres had assumed a spiral shape because of their treatment with formalin and alcohol, and that the coiling was all the more marked if the tissues had previously undergone maceration, whereby they were rendered more permeable to the silver salt. To demonstrate his views he published with the paper a number of micro-photographs.

On looking at these micro-photographs, and comparing them with silver sections from the organs of syphilitic fœtuses, it is obvious that Saling has gone too far. Doubtless at isolated points in his sections silver spirals are seen somewhat similar in appearance to the *Spirochæta pallida,* but there is a very marked difference between these spiral fibres, irregular in their size and in the number and in the degree of their curves, and the true *Spirochæta pallida.* No one acquainted with the Spirochæta can have the least difficulty in distinguishing the two. Further, it is one thing to find two or three spirochæta-like fibres after a careful search, but a totally different thing to find the whole field swarming with spirals, all of which have the regular and typical appearance of the organism. Saling has subsequently published other papers on the same lines [16], but they introduce no new matter, and are chiefly controversial in reply to his critics.

Similar papers have been published by other workers at the Zoölogical Institute of Berlin; in fact, the workers at this institute, Siegel [20], Saling, Schultze [19], and Jancke [6], are the most bitter and persistent opponents of the *Spirochæta pallida.* Siegel claims to have discovered the specific organism for syphilis in the *Cytorrhycta Luis,* and the attacks of this school upon the specificity of the *Spirochæta pallida* seem but part of a plan of campaign to establish the claim of the Cytorrhycta.

Saling's work has met with severe criticism.

Neisser [14], whose opinion is an extremely weighty one, holds that the *Spirochæta pallida* is certainly the cause of syphilis; he disagrees entirely with Saling's work and maintains that the Spirochæta stained by Levaditi's method is the same as that stained in films by Giemsa's method.

Dohi [4] has examined a large amount of material to elucidate the point raised by Saling concerning the influence of maceration in producing so-called silver spirochætes. His conclusions are: (1) in macerated non-syphilitic fœtuses no spirochætes were found; (2) in artificially macerated non-syphilitic tissues from fœtuses (monkeys and guinea-pigs) no spirochætes were found; (3) silver-stained nerve fibrils and connective tissue fibres may be easily distinguished from the *Spirochæta pallida* by their blunt and irregular curves, variations in size and form, and by their brown colour. He admits that in isolated instances a silver-stained fibre may closely simulate a *Spirochæta pallida.*

To several observers sections stained by Levaditi's method have revealed an intracellular position of the Spirochæta—a strong argument against Saling's views. Gierke, in a syphilitic fœtus, found them lying abundantly within the epithelium of the bronchioles and within leucocytes in the lung alveoli. Levaditi [9] and Bab [1] have published similar observations.

Saling's assertion that the Spirochæta could not be found in Giemsa films from organs in which it had been found in silver sections has been refuted by many observers. Mühlens [12] examined the organs of sixteen syphilitic fœtuses, and in all of them he found the Spirochæta both in silver sections and in films. Beitzke [2] has confirmed his results. Care is necessary to find spirochætes in films made from macerated organs, for the organisms seem to adhere very closely to the tissues, perhaps because of their corkscrew form, and maceration interferes with their staining affinity.

These are but a few instances of the results of workers on this point. The amount of literature is enormous, and in reading through it one finds a consensus of opinion that Saling's view of the worthlessness of Levaditi's method is wrong. At the same time it is generally admitted that in sections where only a few spirochætes are present, or where they have been badly stained, care must be taken to distinguish the Spirochæta from nerve endings or deformed connective tissue fibres. But in sections containing many typical spirochætes there can never be any doubt.

We have thought it right, in view of the importance of the case we have recorded, to consider in some detail—(1) the evidence upon which it is claimed that the *Spirochæta pallida* is the specific organism of syphilis, and (2) the reliability of the method of Levaditi in demonstrating the organism.

The opinions we have formed are: (1) that all the evidence accumulated points to the fact that the *Spirochæta pallida* is to be regarded as the specific organism of syphilis, but that positive proof can only be obtained when some method of growing the Spirochæta in pure culture has been discovered; (2) that in spite of the fierce criticism to which it has been subjected by Saling and his followers, Levaditi's method is still to be regarded as reliable for demonstrating the organism.

We believe, therefore, that in the routine examination of the tissues of premature stillborn children we have a valuable method of elucidating the cause of intra-uterine death in certain obscure cases, and that we may be afforded a clue to a line of treatment by which we may prevent the recurrence of such a disaster.

LITERATURE.

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[4] Dohi. *Centralbl. f. Bakt.*, 1 Abt., Jena, 1907, xliv. (orig.), p. 246.
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[8] *Ibid.* *Berl. klin. Wochenschr.*, 1906, xliii., p. 1368.
[9] *Ibid.* *Ann. de l'Inst. Pasteur*, Paris, 1906, xx., p. 41.
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[12] Mühlens. *Centralbl. f. Bakt.*, 1 Abt., Jena, 1907, xliii. (orig.), pp. 586, 674.
[13] Neisser. *Deutsch. med. Wochenschr.*, Leipz., 1906, xxxii., p. 493.
[14] *Ibid.* "Die experimentelle Syphilisforschung nach ihrem bisherigen Stande," Berl., J. Springer, 1905.
[15] Saling. *Centralbl. f. Bakt.*, 1 Abt., Jena, 1906, xli. (orig.), pp. 737, 812.
[16] *Ibid.* Loc. cit., xliii., pp. 70, 162, 229, 233, 362; and xliv., (orig.), p. 339.
[17] Schaudinn. *Arbeit. a. d. kaiserl. Gesundheits.*, Berl., 1905, xxii., p. 527.
[18] *Ibid.* *Deutsch. med. Wochenschr.*, Leipz., 1905, xxxi., p. 1665.
[19] Schultze. *Berl. klin. Wochenschr.*, 1906, xliii., pp. 1213, 1654.
[20] Siegel. *Centralbl. f. Bakt.*, 1 Abt., Jena, 1906, xlii. (orig.), pp. 128, 225, 321, 480, and 1 Abt., 1907, xlv. (orig.), p. 218.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) thanked the authors for their interesting paper, demonstration and discussion of the value of the *Spirochæta pallida*. The case given by the authors, however, did not quite seem to accord with practical experience. A patient who a short time previously had given birth to a fœtus, in the tissues of which large numbers of spirochætæ were found, when again several weeks pregnant had mercury given to her and premature children were born, in the tissues of which no spirochætæ were found; that is to say, as far as the evidence of the authors went, the syphilis had been eradicated by the administration of mercury to a woman pregnant and affected with untreated syphilis. However valuable mercury was in such circumstances, the absolute prevention or cure of syphilis under such conditions would, he thought, be rarely met with in practice.

Dr. AMAND ROUTH believed that much good was to be expected from giving mercury to pregnant women who had previously borne stillborn or syphilitic children. He had seen excellent results, and alluded to one lady whose husband had had syphilis eight years before marriage. She had had two premature stillborn children. She was given hydrarg. perchlor., gr. $\frac{1}{10}$, thrice daily when nine weeks advanced in her next pregnancy, and was delivered at full term of a healthy child. During the next pregnancy no mercury was taken, and the child born was very feeble, soon showed evidences of infantile syphilis, had been almost from birth subject to fits, and was now (aged 5) both mentally and physically undeveloped. The patient again took mercury in her next pregnancy, and the child born was again quite healthy. Neither the mother nor the two children who were born healthy, aged 6½ and 4 respectively, have shown any evidence of syphilis, and they are in perfect health now.

Dr. MAXWELL congratulated the authors of the paper on the frequency with which they had demonstrated the spirochæta. From his own experience he knew how accurately one had to follow the directions laid down by Levaditi in his detailed account to secure a good result. The prolonged immersion of the tissue in silver nitrate solution had to be carried out under true "dark-room" conditions, the interior of an incubator not being sufficient for the purpose. To this he attributed several failures to demonstrate the organism proved later to be present when this precaution had been adopted. He presumed that the presence of the organism in the fœtal tissues was evidence of a transplacental infection and asked the authors how they could account for the fact that the organism had not been identified in the placenta.

Dr. BECKETT-OVERY said that he agreed with the authors as to the claims of the *Spirochæta pallida* to be the specific organism of syphilis. He thought that the possibility of there being other stages in the life-history of the parasite should be borne in mind, and that this might account for the supposed absence of the organism in certain cases and in some phases of the disease. A fact which must not be lost sight of was the occasional infectivity of the tertiary lesions. This had now been definitely proved. When to this was added the fact that the *Spirochæta pallida* had been found in some cases of the tertiary condition, the coördination of these two facts tended strongly in favour of the authenticity of the spirochæta. With regard to the treatment by mercury, he would like to know how the mercury was administered. Personally he was convinced that the injection of metallic mercury was indicated. This method was now well-nigh universal in the Army, and had given splendid results. One case did not prove much but was of value, and he would quote it. A woman who apparently contracted syphilis at the time of her marriage and became pregnant shortly afterwards had come under his care at the third month of pregnancy with unmistakable signs of secondary syphilis of some duration. The patient was given eight injections in all, extending from the third month till the beginning of the eighth, the last being given eight weeks before the child was born. The child as far as he knew was a full-term child, and up to the present—four and a half months—had shown no signs of syphilis. From personal experience he was convinced that the method was free from risk, gave the best results, and that mishaps were due to faulty technique. He had had abscesses in his practice, but with greater experience was certain they could be avoided. It was of the greatest importance to avoid leaving any mercury immediately beneath the skin.

Ovarian Tumour with a foot of adherent Small Intestine successfully removed from a patient aged 58.

By HERBERT R. SPENCER, M.D.

D. H., AGED 58, was admitted to University College Hospital on February 4, 1907, complaining of swelling and pain in the abdomen of five or six years duration, and of shivering fits which occurred nearly every day. The menopause occurred eight years ago; till then menstruation had been regular but scanty. Four years ago she had been in a London hospital for women, under the care of an experienced abdominal surgeon, who had explored the abdomen, tapped the tumour and closed the wound, as "attachments of the tumour were too extensive to be interfered with." Her ordinary medical attendant, who was present, informed me that the exploratory operation lasted two hours.

On admission the patient was of healthy appearance for her age. The abdomen was greatly distended by a tumour, which had all the character of a fixed ovarian tumour, and reached up for 9 in. above the pubes. The girth at the umbilicus was 47¾ in. The scar of the previous operation was 8 in. long, and in it was a small hernia at the umbilicus. The cervix was very high up; the relation of the uterus to the tumour could not be made out.

On February 12, 1907, Dr. Spencer opened the abdomen by an incision 5 in. long, made to the left of the previous scar, to which the tumour was found to be firmly adherent, except at the site of the hernia, which contained non-adherent intestine. The incision was prolonged upwards for 2 in. Above the limit of the old scar the transverse colon was attached to the tumour by adhesions, which passed between the tumour and the transverse mesocolon, and in separating the bowel the transverse mesocolon was torn vertically, and the tear was stitched up with fine silk. The tumour was separated with some difficulty along the old scar, especially at its lower part. It was then seen that a loop of small intestine was firmly adherent and, as it were, incorporated with the tumour on the right side, and was much constricted for a length of 2 in.; its mesentery also was firmly adherent to the tumour. In separating the adhesions some of the mesenteric vessels were torn, and the bowel, which was thin, dark and lustreless at the constricted part, was found to have a small hole in it. The coil was wrapped in gauze while the separation of the tumour from its deeper adhesions was proceeded with.

First it was separated from the bladder and then cleared on the left side, where bowel was adherent. These adhesions were not vascular and were divided without hæmorrhage. The hand was then passed down behind the tumour and carried towards the right. On this side it was found that strong vascular adhesions passed from the part where the small bowel had been fixed on the tumour down to the cæcum, thus anchoring the tumour to the iliac fossa. These adhesions were divided between ligatures close to the tumour, so that the cæcum was not displaced or dragged upon. The vermiform appendix was not seen. The tumour was then brought out of the abdomen. It was found to involve the right ovary. A few adhesions at the back of the pedicle were stripped down with the finger, and the tumour was removed after tying the pedicle with silk.

The damaged loop of small intestine was freed from adhesions which it had formed with the anterior abdominal wall independently of the tumour. It was then drawn up out of the wound, and as it was at the constricted part so thin that a suture would not hold, 12¾ in. of the bowel were resected, the free ends closed by continuous silk suture and a continuous Lembert. A lateral anastomosis was then performed in the usual way. The raw surface of the mesentery was covered in by folding one layer of mesentery over the other and stitching with continuous sutures on each aspect. The left ovary was found to be not enlarged, but covered with adhesions ; it was not removed. The pelvis was then wiped clean and the abdomen washed with normal salt solution, a quantity of which was left in the abdomen. The wall, after excision of the small hernial sac, was sutured with through-and-through stitches of silkworm-gut, buried interrupted silk stitches for the fascia, and fine silkworm-gut for the skin. The whole operation lasted one hour and fifty-eight minutes till the dressing was applied.

The patient made an excellent recovery except for a slight attack of bronchitis. Flatus was passed on the day after the operation. The wound healed by first intention, and the patient left the hospital on March 18, 1907, and was seen quite well nine months later. She had had no trouble with the bowel.

The ovarian tumour and the portion of excised intestine were exhibited. The tumour was multilocular, of the size of a six months uterus, and covered with omental and fibrous adhesions. It ruptured during removal ; the remaining solid part weighed 4 lb. 4 oz. The piece of small intestine had contracted since removal. It was at the operation 12¾ in. long. It was constricted to the size of the little finger in its middle, had firm adhesions around it, and a small hole which would admit a quill.

Hæmatosalpinx with Acute Symptoms following Retroversion of Fibroid Uterus.

By Alban Doran, F.R.C.S.

R. H., aged 38, applied to my colleague, Mr. Butler-Smythe, in the out-patient department at the Samaritan Free Hospital on January 6, 1908. Five weeks previously, when engaged in ironing linen, the patient was seized with violent pains in the lower part of the abdomen and frequent vomiting. These symptoms lasted for six days and confined her to bed. Then she got up, but when she returned to her household duties she began to be troubled with persistent dull hypogastric pain; the vomiting, however, did not recur. She was obliged to take to her bed again, and did not get up until the day on which she applied to the hospital for relief. The patient had been married seventeen years, and had borne to term one child, now aged 15. She had never had another pregnancy and had never before the present illness suffered from symptoms suggesting pelvic disease. The patient rested at home for a week longer, but as there was no improvement Mr. Butler-Smythe sent her into my wards.

Condition on Admission.—The patient was well-nourished, looking younger than her age, but was anæmic, with suborbital pigmentation. The tongue was clean, the temperature normal, the pulse 84, small volume, regular; the urine of a somewhat low specific gravity, but free from albumin. The periods were quite regular and there was no history, recent or distant, of menorrhagia. The patient declared that she had never suffered from any serious illness nor from any pelvic pains until last December. The abdomen was not distended, and there was no tumour above the pelvic brim. A hard mass of the size of a tennis-ball could be defined in Douglas's pouch; it seemed to be fixed. The cervix uteri was well developed and hardly displaced; although the hard mass lay more to the left, the right side of the body of the uterus was evidently connected with it, so as to give me the impression that the mass might be a fibroma of the right ovary which had fallen backwards and to the left. A tubal gestation sac often drops down towards the opposite side of the pelvis in this manner, but there had been no interruption to the catamenia and no irregular hæmorrhages. Altogether the probability seemed to be that the mass was a fibro-myoma, but I thought that it lay in the posterior wall of the uterus. On January 21 the period set in. It was not very free, and the pelvic pains continued unabated, but did not increase in severity.

Operation.—I operated on January 28, nine weeks after the acute attack of pain occurred. Some adherent small intestine covered the pelvic viscera; on separating it the body which occupied Douglas's pouch was drawn up, after the division of some adhesions to the peritoneum. Then it was seen to be a small, heavy, oval fibroid connected with the fundus of the uterus, which it had drawn backwards. I enucleated the fibroid, but could not satisfactorily check the hæmorrhage from the big cavity left in the fundus after the base of the fibroid had been enucleated. I therefore amputated the uterus above the cervix, removing as well the appendages, which were evidently diseased.

The patient made a good recovery.

Appearances of the Parts Removed.—The tumour was a perfectly solid fibro-myoma, oval in shape, measuring vertically 3 in., horizontally 2¼ in., and antero-posteriorly 2 in. The uterine walls were greatly thickened. The ovaries showed little sign of disease, but both Fallopian tubes were obstructed, convoluted and dilated. The parts removed were more closely inspected at the College of Surgeons. The tumour weighed 4 oz., being rather heavy in proportion to its size, and was much bigger and firmer than the body of the uterus. The right Fallopian tube was obstructed, irregularly dilated, and about 3½ in. in length. The tubal walls were very thick except towards the abdominal extremity. They were also markedly blood-stained. The canal was divided into incomplete septa; it contained a little fluid blood when fresh. The left Fallopian tube was obstructed and still more irregularly dilated, measuring about 3¾ in. in length. The walls were not so much thickened as on the right side, and showed no blood-staining. The canal, divided into incomplete septa, was filled with recent solid clot, not decolorized. Thus the left tube was converted into a hæmatosalpinx, whilst the right had undergone a somewhat different change, blood having been infiltrated into its coats rather than effused into its canal.

REMARKS.

When we inspect this specimen, bearing in mind the clinical history of the case, we cannot fail to be struck by the insignificant proportions of the tumour as compared with the severe acute symptoms which it caused when it was displaced. The explanation, however, becomes easy after a very little consideration. A small but heavy fibroid was attached to the upper border of the fundus of a uterus otherwise but little enlarged.

These relations favoured acute retroversion. The tumour, much too small to be arrested at the pelvic brim, fell back into Douglas's pouch, causing a heavy strain on the broad ligaments. As these ligaments had not become hypertrophied, after the fashion so marked when a fibroid develops lower down in the uterus, the tension was severe. The first effect of the tension was intense pain and vomiting, whilst later on the obstruction to circulation in the vessels supplying the Fallopian tubes caused hæmatosalpinx. In cases where a small uterine or ovarian outgrowth, or the body of the uterus, suddenly falls backwards into Douglas's pouch, the pain and obstruction to circulation are no doubt due in part to incarceration of the retroverted mass between the utero-sacral ligaments, which, as I found to be the case in this instance, may grip them firmly. A small cystic tumour of the ovary lying in Douglas's pouch may in this manner be associated with painful symptoms, and thus simulate an inflamed and swollen ovary.[1] The hæmatosalpinx in this specimen was clearly a result of the retroversion of the fibroid. The Fallopian tubes must, however, have been obstructed at the ostium before the displacement occurred. The subject of torsion of the dilated tube and hæmatosalpinx is very familiar to members of the Section, and recent articles in which British writers discuss it must be well known to all of us. A good instance of an acute case was reported last year by Stratz;[2] the cause of the complication was a violent strain when the patient was moving furniture. In my case, however, the hæmatosalpinx was associated with uterine myoma, and I exhibit the specimen mainly because Dr. Macnaughton Jones showed another specimen where the same conditions coexisted at the February meeting of the Section.[3] Beyond the coexistence of the fibroid and a hæmatosalpinx, however, the cases were different. Dr. Macnaughton Jones's patient had been subject for some time to uterine hæmorrhages, and a recent attack of an acute inflammatory, not purely mechanical, complication had occurred. The fibroid uterus was of about the size of a fist, whilst the hæmatosalpinx formed an abdominal tumour of considerable bulk. In discussing the case I expressed an opinion that the uterus might have been malformed, a condition associated with one of the most typical forms of hæmatosalpinx.

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[1] I have reported an example of this condition in a communication on "Ovarian Tumours simulating Inflamed Ovaries, including a Case of Ovarian Myoma," *Edin. Med. Journ.*, iii., N.S., 1898, p. 449.

[2] "Akute Stieldrehung einer Hämatopyosalpinx," *Zentralbl. f. Gynäk.*, xxxi., 46, 1907, p. 1444. Naturally, tubal pregnancy was suspected.

[3] "Hæmatosalpinx complicating Myoma," *Proc. Roy. Soc. Med.*, 1908 (Obstet. and Gyn. Sec.), i., No. 5, p. 122.

Primary Unilateral Tuberculosis of the Fallopian Tube.

By H. MACNAUGHTON JONES, M.D.

Early Literature.—A few preliminary words on tuberculosis of the female genitalia may be permissible. Perhaps the first most extensive review of this subject was that of Merletti in the *Archiv. di obstet. e ginæ.* (*Archives of Obstetrics and Gynæcology*), 1901, an abstract of which was made for the *British Gynæcological Journal* by Dr. Frederick Edge. Dr. Comyns Berkeley wrote a comprehensive paper on tuberculosis of the female genitalia in the *Journal of Obstetrics and Gynæcology of the British Empire* in January, 1903, but one of the most complete digests was that of Professor J. B. Murphy, of Chicago, who took this subject as his theme for the Presidential Address to the Chicago Surgical Society in October, 1903. In the *Edinburgh Medical Journal* of August, 1904, I reviewed the main facts which up to then had been codified, including those contained in the above-mentioned contributions and others, with a reference to two cases of my own, the particulars of one of which, in consequence of recent developments, forms the principal subject of this communication.

Relative Frequency; Sex; Age.—(*a*) Tuberculosis of the genitalia, as first shown by A. Martin (1892 Rome Congress), is much more frequent in females than in males, and in tuberculous women post-mortem statistics prove that the genitalia are affected in proportions varying according to age, whether before puberty, during the child-bearing period or after the menopause. This may accordingly vary from 4 per cent. to 12 per cent., or as much as 22 per cent.

(*b*) *Heredity and Infancy.*—Tuberculosis appears in some infants and children to have a distinct hereditary and congenital origin.[1] George Carpenter has recorded several cases of tuberculosis of the genitalia in young female children. Demme had a case of an infant at 7 months, and Carpenter two cases at 14 months. Here tuberculosis of the ovary appears to occur more frequently than tuberculosis of the tube, the reverse of what occurs in adult life.

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[1] Amann, Fourth International Congress of Obstet. and Gyn., Rome, 1902; Gottschalk, *Archiv. f. Gynäk.*, 1903, lxx., p. 74.

(*c*) *Vehicles of Infection.*—The blood may be a vehicle of infection (Kleinhans, Veit, Schottlaender) in a certain proportion of cases, the peritoneum in others; coitus and testicular contact or the urine in others. Abrasions of the genitalia increase the risk.

(*d*) *Carcinoma and Tubercle.*—Care has to be taken to discriminate between certain cases of advanced carcinoma and tuberculosis, especially when the peritoneum is extensively involved, and the remote possibility that carcinoma may exist side by side with the tuberculosis has to be remembered.

(*e*) *Diagnosis.*—Diagnosis may be difficult or impossible, dependent upon the stage, site, and extension of the disease. Hegar's nodules are the most characteristic local sign. Collateral signs and symptoms, together with microscopic examinations, are the verifying evidences.

(*f*) *Relative Frequency in Site.*—As to the relative frequency in the site of the disease tubercle of the vulva or vagina is very rare; tubercle of the portio is rare; tubercle of the fundus is not so rare; tubercle of the Fallopian tube is the least rare of all the forms of tubercle of the genitalia; tubercle of the ovary is not so rare. As to primary tubercle, in the vulva and vagina it is extremely rare; in the portio and cervix it is very rare; in the fundus extremely rare; in the Fallopian tube very rare; in the ovary it is doubtful if there is a single authentic case recorded.

Histology; Differentiation in Type.—As regards the differentiation of the type of the tuberculous invasion we may summarize the histological and pathological characteristics thus: In the *vulva* it has more frequently (Matthews Duncan) assumed the character of lupoid ulceration, difficult to diagnose from rodent ulcer (with or without involvement of the lymph glands); in the *vagina*, miliary tubercle resulting in caseous degeneration and ulceration; in the *portio*, miliary and disseminated, or miliary and bacillary (there are also ulcerative or erosive and papillary or fungus types) (Murphy); in the *fundus*, Pozzi's division seems to me the best—acute miliary, interstitial, ulcerative. These three states may coexist (Stolper). The most frequent histological sequences are glandular cell proliferation, epithelium proliferation with giant-cells, caseous degeneration and ulceration.

In the *tube*, miliary tubercles are disseminated on the peritoneal surface or diffused throughout the mucosa; closure of the fimbriated ends by adhesions, twisting, or caseous blocking is frequent; occasionally fibroid thickening of the tubal walls is associated with closure of the tube ends, or there may be a nodular condition of the tube. As consequences, in either case, we may have either caseous degeneration and blocking or pyosalpinx or hæmatosalpinx. In the *ovary* miliary tubercles are found on the peritoneum, in the stroma or in the follicles, leading to caseous degeneration and suppuration.

Unilateral Primary Tuberculosis.—My communication deals with primary unilateral tuberculosis of the Fallopian tube. I am limited to time, so you will pardon the obvious abruptness which has to characterize the condensation of my remarks. I am saved from giving some details of cases by the fact that much that I would have to say of these has been already published by me, and I have circulated for the members present these particulars, with illustrations, which will obviate the necessity of my reading them.

The reason of this communication to the Section is : the existence of primary tuberculosis of the Fallopian tube is questioned by some gynæcologists, while it is recognized by others, and all acknowledge that a *unilateral primary tuberculosis* is extremely rare. I consider that I have had two absolutely authentic cases of unilateral primary tuberculosis of the tube and one case of bilateral primary tuberculosis. In one of these cases I have had the unusual opportunity of performing cœliotomy six and a half years after the removal of the tube and ovary of the affected side.

Case A.—In July, 1901, I operated on a patient whom I had seen and recommended operation to in the previous January. I removed a large unbroken left pyosalpinx, a healthy ovary, and a large post-mesosalpinx cyst. Mr. Targett was present at the operation and Dr. Charles Noble, of Philadelphia. The former carefully examined the removed tube and reported : " The external surface of the specimen is covered with thin fibrous adhesions in which many miliary tubercles are embedded. The lumen of the tube is filled with thick caseous pus, and the inner surface is shaggy from ulceration of the mucous membrane. There is very little thickening of the wall of the tube anywhere, and in some parts it is much thinned by distension and ulceration. Microscopical sections of the undilated uterine end of the tube exhibit general thickening of the mucous membrane and infiltration with miliary tubercles. The epithelial lining is for the most part intact." Some adhesions bound down the right ovary, but the ovary itself and the tube were quite normal. There was no sign of any uterine involvement. At the end of 1902 she had some endometritic discharge, so I thoroughly curetted the uterus and had the curettings examined for tubercle, but the result was negative.

In January, 1903, she had a twin labour. In 1904 she was again confined, again in 1905, and on December 2, 1907, she had her fourth labour since the operation. I condense from the notes given me the particulars of this labour. Fourteen days previous to it she had an attack of pain and vomiting, which subsided with treatment, though some abdominal pain continued, and two days before labour, which was a very rapid and natural one, there was a recurrence of the symptoms. There had been frequent attempts made by drugs to terminate pregnancy. She was extremely anæmic when it set in. After labour a tense sensitive swelling was found in the right iliac region. A vaginal examination made on the fourth day did not disclose any uterine, adnexal or perimetric trouble. Micturition was normal; the bowels had been moved by enema. On that day there was violent pain, the temperature rose to 104° F. and the pulse to 130. I saw her the next morning and found the uterus fairly free. There was no marked adnexal swelling, but a slight bulging in the right fornix with a defined hardness in the iliac region. As the

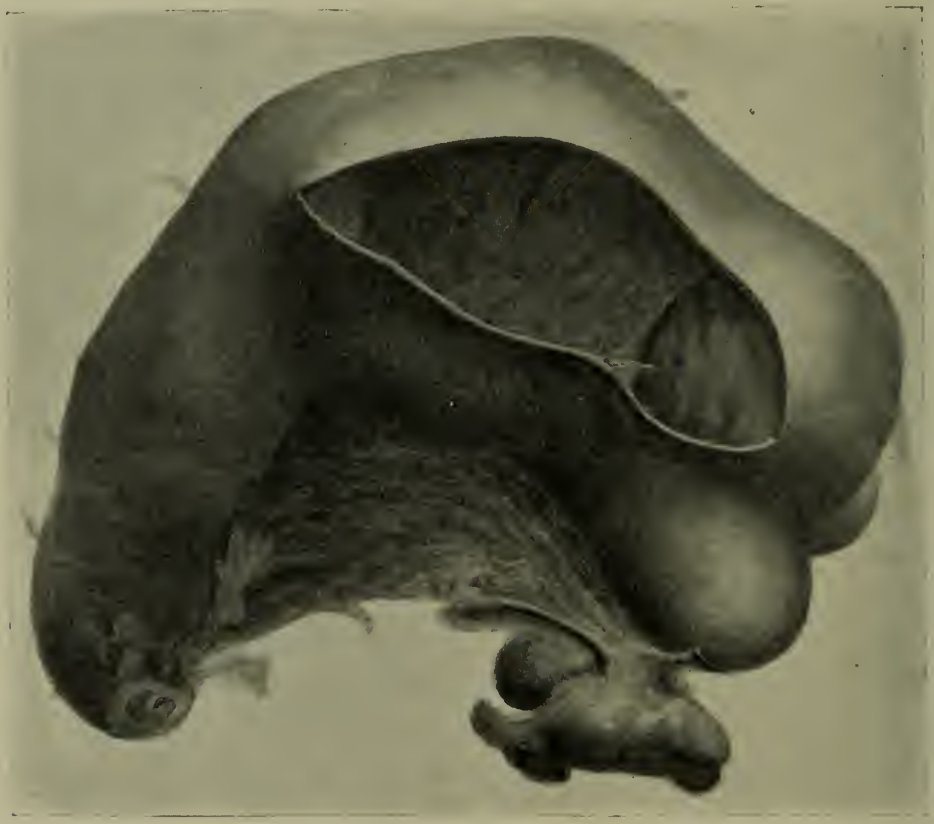

FIG. 1.

Tube removed at first operation (Case A).

temperature and pulse had both fallen I postponed interference, considering the case one of appendical inflammation with involvement of the adnexa. From this until the date of the operation (thirty-nine days after labour) the symptoms varied, the temperature and pulse fluctuating, both being at times normal, and the iliac swelling subsiding; but later on the induration recurred, the uterus gradually became fixed, the temperature and pulse went up, and cœliotomy was performed.

Operation.—I was assisted by Dr. Vaughan-Sawyer. Anæsthesia was secured by the scopolamine, morphia and chloroform method. The patient was extremely weak and bloodless when placed on the table. There was a mass of adhesions occupying the lower abdomen and pelvis from side to side. Some adhesions marked the site of the old operation, but this, the left side, was generally free of infiltration. On the right a large exudation included the uterus, the adnexa and the broad ligament, and extended to the pelvic floor, involving the sigmoid, reaching the cæcum and appendix above. This necessitated careful stripping in the isolation of the mass. The broad ligament was softened and greatly thickened, the clamp cutting right through the softened structures wherever applied. Ligature of the uterine and tubo-ovarian arteries ultimately arrested the very troublesome hæmorrhage. The appendix was engorged, but there was no evidence of any very serious implication, and the condition of the patient was far too critical to delay for its removal.

Matters went on well until the sixth day after operation, when complications set in which ultimately resulted in an exudation rising half way to the umbilicus, a softening of the abdominal wound, which had closed, and some escape of pus from its lower angle. On the tenth day I opened up the entire wound, freeing a quantity of purulent matter which had collected over the fascia, reopened the peritoneum by a small incision and evacuated nearly a pint of purulent matter. She was treated by careful cleansing of the cavity with formalin solution and drainage, and left the home quite well on March 2, and is now in excellent health. Her four children are strong and healthy, and there is no evidence of any affection in any part of the body.

Pathological Report by Dr. Cuthbert Lockyer.—"Macroscopically the ovarian and tubal tissues are seen matted into a uniform mass, which on cut section shows the lumen of the tube blocked by inflammatory products. The ovarian part of the specimen is diagnosable by the peripheral dropsical follicles. No plicæ are to be found, the outer end of the tube being fused with the ovary."

Histological Report.—"The right tube and ovary are matted together. The lumen of the tube shows the plicæ replaced by granulations, and the musculature is infiltrated with round-cells. The ovary shows acute inflammatory reaction in the shape of leucocytic infiltration and œdema. The case is not tubercular."

(The section of the adnexal mass was shown with the epidiascope.)

Being interested to ascertain and find out what the experience of other gynæcologists was in regard to such a case I wrote to several British gynæcologists and to a few personal friends abroad, asking them if they had seen *primary unilateral tuberculosis of the Fallopian tube,* in which removal was followed by permanent recovery; if there had been subsequent pregnancies, and if any consequences followed parturition; also, what was the nature of the pathological changes found, and if a correct diagnosis was made before or subsequent to the operation? At the time of writing I have had replies from twenty British surgeons and thirteen foreign. Of the British, thirteen replied in the negative and seven in the affirmative. Of the foreign, ten answered in the negative and three in the affirmative. Professors v. Rosthorn, v. Krönig, Schauta, Olshausen Landau, Bossi, Jacobs, Mangiagalli, Pozzi, Lapthorne Smith and Dr Charles Noble had never had a case of the kind. Professors Bumm, Prochownick and Zweifel had; and of the home gynæcologists, Mr. Doran and Drs. Cuthbert Lockyer, Newnham, Ballantyne and Purefoy were the only ones who had operated on what they believed to be primary unilateral tuberculosis of the Fallopian tube. Professor Bumm's case was one of twenty-five years tuberculosis of the right tube resulting in pyosalpinx; the tubercle was discovered at the operation, and the patient was well for two years subsequently. Dr. Prochownick had three cases. There was return of the disease in all three. Two died, one of recurrence in the other tube and lungs, a second from recurrence in the *lung,* and the third made a perfect recovery after total extirpation of the genitalia. Two of the cases were parenchymatous, one a pyosalpinx. Two of the three were discovered at operation.

Professor Zweifel says that they have had such cases in the Leipzig Frauen-Klinik generally resulting in pyosalpinx, and the nature of the disease was proved microscopically or by physiological experiment. Dr. Newnham has also had a case followed by subsequent pregnancies; the condition was a pyosalpinx and the nature of the disease discovered after operation. Professor v. Krönig has had cases of primary tuberculosis but not unilateral.

Dr. Ballantyne's case was reported as one of primary tuberculosis in the *British Medical Journal* of January, 1901. The patient was unmarried.

Dr. Purefoy's case was one of tuberculosis of the peritoneal coat only, discovered at the operation.

Sir William Smyly had a case in which the rectum was involved with the tube. On subsequently opening the abdomen the general peritoneum and tubes were equally involved. The lungs were then attacked. She is still alive and well. The operation took place ten years since. He cannot, however, regard it as a case of primary tuberculosis.

Mrs. Stanley Boyd operated on a case of unilateral tuberculosis of the tube, but the pouch of Douglas was also invaded. At a subsequent operation for radical cure of hernia, the pelvis appeared to be quite free from disease.

In Mr. Alban Doran's case he removed the left tube in January, 1904, when performing hysterectomy for myoma. The right adnexa appeared quite healthy. The left tube was tuberculous and enveloped in thickened omentum. The uterus was healthy. In May, 1906, the patient was well. The case was reported on by Dr. Cuthbert Lockyer.

My other case (B) of primary unilateral tuberculosis of the Fallopian tube occurred in a patient, aged 29, a nullipara, and was associated with hæmatosalpinx. She was operated upon by me in 1898. The specimen is on the table; it was shown at the Gynæcological Society. Mr. Targett reported: "The outer half of the tube is considerably enlarged and its lumen uniformly dilated. The abdominal ostium is closed by adhesions, but traces of the fimbriæ can be discerned on the exterior. The surface of the tube is generally free from adhesions, though there are a few fibrous threads on the ovary. A section across the dilated portion of the tube shows a marked thickening and rugosity of the mucous coat, as well as a finely granular appearance of the mucous surface. The lumen is filled with blood and retained secretion. Microscopical examination reveals an abundance of grey tubercles in the substance of the mucous membrane, the giant-cell systems being well developed (fig. 4). The muscular coat is not yet invaded, though the tuberculous formation has advanced in that direction. The epithelial covering of the thickened rugæ is for the most part preserved. The adjacent ovary presents a recent corpus luteum, and its substance is healthy. There is a striking absence of any peritoneal lesion, and for this reason it is probable that the tuberculosis of the Fallopian tube is primary." The last time I saw the lady she was in excellent health; there were no subsequent pregnancies.

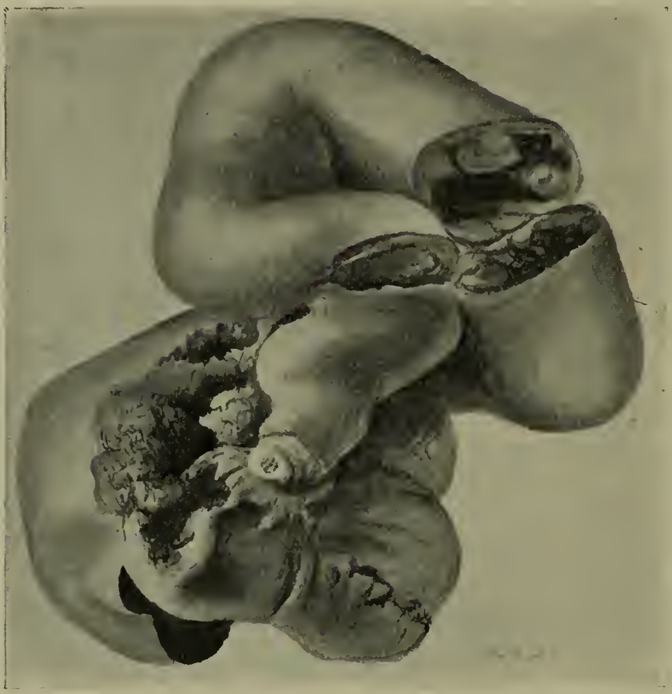

Fig. 2.
Showing section of Tube (Case B).

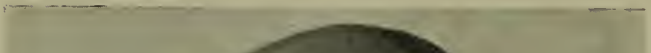

Fig. 3.
Showing section of Ovary (Case B).

The third case (C) of primary tuberculosis of the Fallopian tube was one in which both tubes were diseased. The patient was one year married, and in every other respect was a healthy woman. She was aged 23, had only complained since marriage of menorrhagia and pelvic pain, which had become worse of late; walking was more difficult and her general health was failing.

On examination the adnexa were found enlarged, and oöphorectomy was advised. At the operation extensive adhesions were found and the right ovary and tube were embedded in exudation, rendering the operation somewhat difficult and tedious. On exposure of the broad ligaments some few small yellow granules, about the size of millet seeds, were seen on these; this raised a suspicion of tubercle. There were none elsewhere on the peritoneum or bowel. The left Fallopian tube, which was thickened and enlarged, was also removed. The tubes were resected from the uterine cornua, which were included in the ablation.

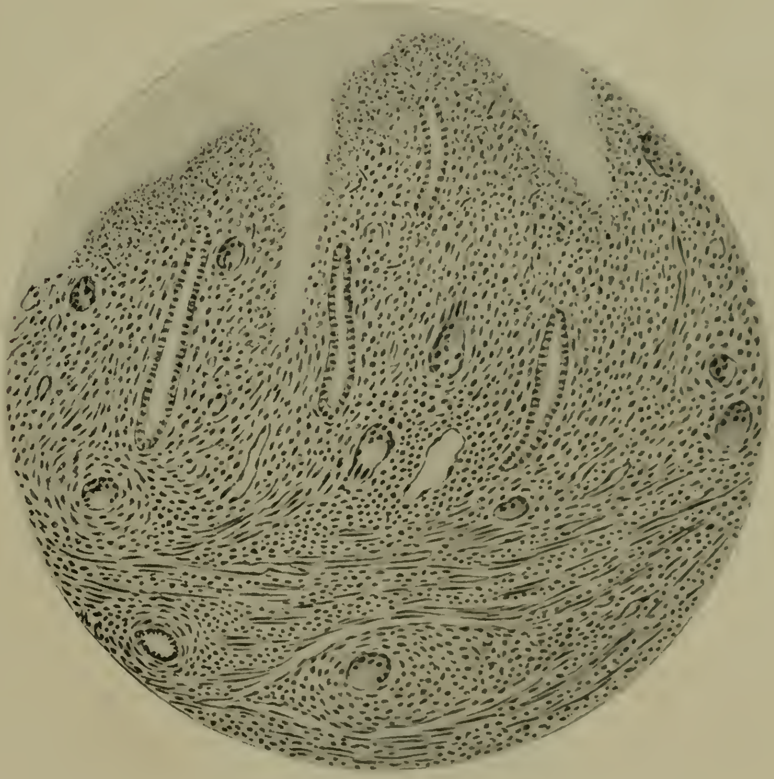

FIG. 4.

Primary Tuberculosis of Fallopian tube. × 100. (Case B.)

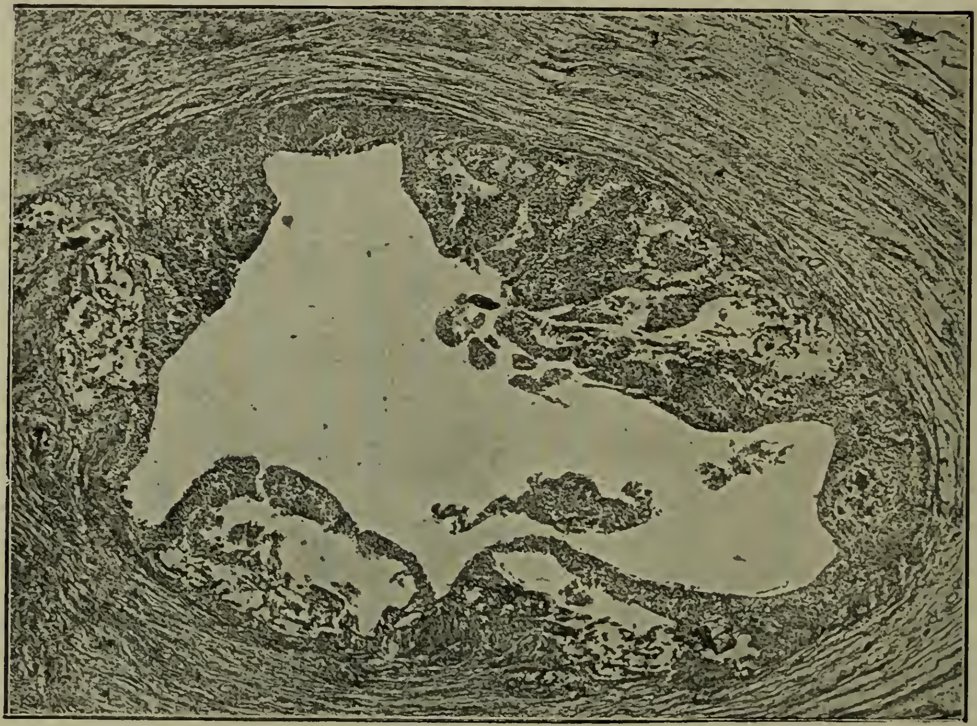

Fig. 5.

Right Tube. × 28. (Case C.)

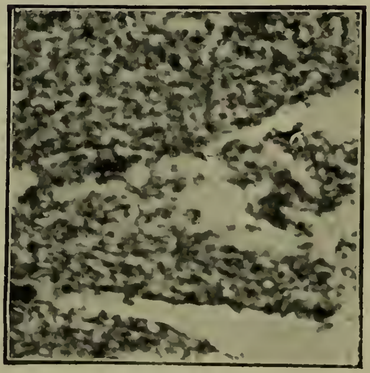

Fig. 6.

Portion of Mucosa. × 180.

Dr. Cuthbert Lockyer's report on the specimen was as follows: "The tubes and ovary have been examined microscopically. Both tubes show the presence of tubercle in their mucosa; the plicæ are infiltrated with round-cells, and distinct foci of tubercle containing giant-cells are seen in the swollen infiltrated folds. The thickened fibro-muscular walls show no evidence of tubercle, the disease being confined to the mucosa. The right ovary is œdematous; it shows no sign of tuberculous disease. It contains no healthy follicles, but presents some hæmorrhagic areas and degenerate lutein tissue, and a few corpora albicantia." (The section was shown with the epidiascope.)

DISCUSSION.

Mr. SPANTON congratulated Dr. Macnaughton Jones on having had no less than three such rare and important cases, which opened up many points of interest. They recalled to his mind the case of a patient on whom he operated many years ago which was published at the time,[1] and was in many respects similar to one of those recorded by the author of the paper. It occurred in a single young woman, aged 17, who had suffered for many months from pelvic pain, and afterwards from intractable cystitis. At the operation the right Fallopian tube was found to contain hard nodules, and also the ovary. Both these were removed, microscopic sections were made, showing quite clearly their tuberculous character. After the operation the cystitis entirely disappeared, and in less than a month afterwards the patient was well enough to take part in the infirmary dance. Some years after this the patient married, and was then perfectly well, but has since been lost sight of. This case, taken with those of Dr. Macnaughton Jones, seemed to indicate that tubercle in this region, as elsewhere, might be eradicated if dealt with early enough.

Dr. MACNAUGHTON JONES, in reply, said Mr. Spanton's case was of interest, and he should like to have the details of it to add to the others he had referred to. The nodular appearance of the tube was at one time thought to be characteristic of tuberculosis, but this had been quite disproved. Though some gynæcologists of note were inclined to altogether dispute the existence of primary unilateral tuberculosis of the tube, the cases he brought forward absolutely proved that it did occur. There was this practical lesson, that in trusting to Nature for the cure of an adnexal tumour, in an otherwise apparently healthy woman, we might incur the risk of a general pelvic or peritoneal tuberculosis later on.

[1] *Brit. Med. Journ.*, 1884, i., p. 881.

Three Cases of Cæsarean Hysterectomy for Stenosis of the Vagina.

By KEDARNATH DAS, M.D.

CASE I.—*Complicated with a Vesico-Vaginal Fistula.*

A BENGALI lady, aged 35, in labour, was admitted into the Campbell Hospital on September 8, 1903. She had her first child in 1881 when she was aged only 13, and the head was said to have been at the vulva for two complete days before she was delivered by forceps. Dribbling of urine began after ten or twelve days. In 1883, two years after her first labour, she was admitted into the Eden Hospital, and during her three months stay was operated on three times for the repair of a vesico-vaginal fistula by the late Dr. Harvey, but without success. She became pregnant for the second time eight or nine years after. Abortion took place at the sixth month; the fœtus had to be brought away piecemeal, and she was confined to bed for four months before she got well. She menstruated regularly, but the flow has been getting scantier.

When I saw the patient in her house, about two months before her admission into the hospital, she was in the seventh month of her third pregnancy. She had a large vesico-vaginal fistula, the posterior margin of which was drawn backwards by cicatricial tissue at the vault of what represented the vagina, where a small dimple could be noticed representing the os uteri. There was scarcely any healthy vaginal mucous membrane, and no vestige of the cervix.

As delivery *per vias naturales* was impossible I advised that the patient should be allowed to go to full term, and Cæsarean hysterectomy should then be performed. I further instructed the friends to bring her to hospital at least a fortnight before her expected time or before full term at the slightest indication of the onset of labour. I was, however, called to see her at her own house at about 2 p.m. on September 8, 1903, after she had been in labour for several hours. She was taken to the Campbell Hospital as soon as possible, and I performed Cæsarean hysterectomy at 6 p.m., with intraperitoneal treatment of the stump and without removing the ovaries. Within twelve hours of the operation there was marked tympany of the abdomen, which progressively increased in spite of treatment. She steadily became worse, and died fifty-two hours after operation. The child lived and was taken away by the father.

CASE II.

A Bengali lady, aged 18, was admitted, in labour, into the Campbell Hospital on October 10, 1905. She had become pregnant for the first time when aged 14 and a few months, and had been delivered by forceps of a dead fœtus on March 16, 1903, after a prolonged labour lasting about thirty-six hours, followed by slight fever for the first ten days after delivery, and a persistent high temperature for a month afterwards. She conceived for the second time nine months before her admission to the hospital. I had seen her about six weeks before admission and detected a very marked cicatricial contraction of the vagina, barely admitting one finger, and had found that her pelvis was generally contracted. I advised the husband to bring her to hospital for a Cæsarean section in about a month's time. I was, however, called to see the patient on the afternoon of October 10, 1905, at her own house, and was told that there had been slight pains for two days.

Evening at 7 p.m.—The fœtus was lying transversely; the fœtal heart sounds were not audible; the cicatrix was slightly softer, and the cicatricial ring admitted one finger only. On my advice she was brought to the hospital at about 11 p.m., with some difficulty, in a rickety hackney carriage, over a distance of four miles.

On admission her general condition was not at all good; she had a temperature of 101° F. and a pulse of 130. She was hastily prepared for the operation, and Cæsarean hysterectomy with intraperitoneal treatment of the stump was performed by me at 11.30 p.m. I decided to remove the uterus to spare her the risk of another confinement, but both ovaries were left. The fœtus had apparently been dead for some time. Her recovery was uneventful except for an attack of malarious fever on the fourteenth day after operation, from which she recovered in a few days. In January, 1907, she was in good health and was doing her ordinary household duties.

CASE III.—*Complicated with an Irreparable Vesico-Vaginal Fistula.*

A Bengali female, aged 20, was admitted into the Campbell Hospital on October 30, 1906. She had had a child four years previously after a very difficult labour, protracted and instrumental, and though she recovered after a prolonged illness, had constant dribbling of urine and incontinence of fæces. The following conditions were noted when she was admitted to the hospital two years ago: "The whole base of the bladder has apparently sloughed away. There is a chink, representing the os externum, at the upper margin of the rent. The posterior wall of the vagina is represented by a small cicatricial surface. The perineum is ruptured, but the sphincter is not torn. Above the intact sphincter there is a recto-vaginal fistula about 1½ in. long." For this miserable condition I undertook the following operations: (1) On July 19, 1903: A plastic operation for the recto-vaginal fistula, with complete success. (2) On August 21, 1903: An operation for the extension of the perineum, which gave the patient partial relief by allowing the urine to be retained for a time by the help of a small pressure pad on the vulva. Owing to the presence of cicatricial tissue at the sides of vaginal outlet, extension of the perineum to the desirable extent was not possible. (3) To obviate this difficulty a plastic operation was undertaken on January 9, 1904. The urethra was dissected and brought down, so that its posterior margin could at some future date be stitched up to the anterior margin of the extended perineum. The portion of the wound anterior to the urethra was brought together by interrupted silkworm-gut sutures. The effect of the operation was that the urethral opening came to a lower level and a deeper plane of the extended perineum. This latter acted as a flap valve to keep the urine in the cloaca for a certain time with the help of a very slight pressure on the parts with a pad.

The patient lost patience and took her discharge from the hospital after a stay of about six months, but came back after a month with some of my work undone. I ascertained that she had been to another hospital, where the usual examination was attempted and the anterior portion of the extended perineum was torn. I operated again on March 7, 1904, and she left the hospital after the last operation as happy as possible with her ameliorated condition.

In August, 1906, she came to me as she had had no periods since the beginning of April, and there was a swelling in the lower abdomen, and to my surprise I found that she was pregnant. An examination of the vulva revealed that the small opening of the cloaca was elastic and the skin round it had radiating folds, like those round the anal orifice. There was evidently a sort of pseudo-sphincter. A pad over the vulva kept her dry for about an hour. Cæsarean hysterectomy was the only way possible to deliver her, and she was admitted into the hospital on

October 30, 1906, and kept under observation. I operated on January 4, 1907, though the patient was not in labour. The abdominal incision was 7 in. long, the whole of it being below the umbilicus. The uterus was incised, in situ, in the middle line. The placenta was right in front and there was smart hæmorrhage. The child was rapidly delivered by foot, the uterus was brought out of the abdominal cavity, and the broad and round ligaments were divided between ligatures, leaving the ovaries, and the uterus was amputated through its lower segment and the uterine arteries tied. Up to this stage of the operation there was very little deviation from the usual methods. The treatment of the stump and the disposal of the broad ligaments were modified to suit the case. I wished to keep the stump extraperitoneal, but not by the classical method of Porro, which is unsurgical, inasmuch as it allows a mass of tissue to slough away. The reason for the extraperitoneal treatment of the stump was to do away with the risk of infection from the vesico-vaginal cloaca, which was in direct communication on the one hand with the uterus, and on the other with the vulva and external air. This I achieved in the following way: After amputating the uterus through the lower uterine segment, the anterior and posterior walls of the cut edges were brought together by interrupted silk sutures, passed through the muscular tissue only. The ends of the sutures were left long to act as tractors on the stump, which was kept at the lower angle of the abdominal incision during the subsequent steps of the operation. The stumps of the ligatured ovarian vessels were brought together in the middle line, behind the cervix. The loose broad ligaments were thus folded on themselves, and the folds were brought together at their upper margins. The parietal peritoneum was then brought taut round the uterine stump and the approximated ends of the stumps of the ligatured ovarian vessels; the peritoneum on the posterior aspect of the lower uterine segment and the parietal peritoneum on either side, at the same level, were brought together by a silkworm-gut suture. A continuous suture was put in to fix the peritoneum round the uterine stump with the parietal peritoneum in the lower angle of the wound. The stump was thus practically treated extraperitoneally. A little iodoform gauze was put in above the stump and between the abdominal parietes in the lower angle of the abdominal incision and the incision stitched up in the usual way.

The after-treatment of the case gave no trouble. The piece of gauze was changed on the third day and dispensed with altogether in a couple of days more. The stitches were taken out on the tenth day and perfect aseptic union took place. The patient was allowed to nurse her baby during the day. She left hospital with her baby on February 9, 1907.

The case is interesting for the following reasons: (1) The distressing condition when first seen; (2) the relief that was given under such hopeless conditions; (3) conception taking place under such peculiar circumstances; (4) the modifications in the operation that were thought advisable and carried out.

I would invite discussion on two points: (1) whether any member of the Section, from his personal experience, thinks that closing the vesico-vaginal fistula should have been attempted. I may say that from my experience of these bad fistulæ, which is unfortunately pretty large, and includes attempts to repair fistulæ with extensive division of cicatrices and freeing the bladder from the surrounding tissue and making a bladder of smaller capacity, I thought the present case to be hopeless; (2) whether the method adopted for treating the stump and dealing with the broad ligaments has been superfluous. The modifications were undertaken after a good deal of thinking, and in consequence of the bad result of Case I., which very probably was due to infection of the perineum from the vesico-vaginal cavity. Certainly the extraperitoneal treatment of the stump gave me in the present case a sense of security, which was a great relief.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) remarked on the rarity in this country of such severe lesions as those not uncommonly met with amongst the poor women of India. He preferred total removal of the uterus to supra-vaginal amputation for cases requiring hysterectomy; but he had seen delivery occur naturally by splitting of the cicatrix in a case of extreme vaginal scarring. He thought in Case III. the vesico-vaginal fistula should have been operated on and would have been cured by the author, who had successfully closed the recto-vaginal fistula, the operation for which was not so successful as that for vesico-vaginal fistula, which he thought could always be cured.

Dr. AMAND ROUTH congratulated Dr. Das upon his skilled treatment of the three cases reported. He referred to a case which he had reported at this Section in October, 1907, which he had successfully treated by Cæsarean hysterectomy, after repairing an extensive vesico-vaginal fistula. Dr. Routh considered Dr. Das had treated his cases correctly in performing Cæsarean hysterectomy rather than performing simple Cæsarean section, inasmuch as cases thus treated are efficiently sterilized, and there is no risk of sepsis from retained lochia. He thought that the only way that Dr. Das could have cured the vesico-vaginal fistula in his third case would have been to dissect off the bladder from its connections and draw it down into the vagina as an empty sac, as he had done in his own case. Dr. Das's first case, which died, was almost hopeless from the beginning, and Cæsarean hysterectomy gave the patient the only possible chance of life. He had collected,[1] including Dr. Das's three cases, thirty-three cases of Cæsarean hysterectomy with a total mortality of seven, or 21 per cent. In twelve of these cases the stump had been treated intraperitoneally, and of these eleven recovered, a mortality of 8·3 per cent.

Creatinin Excretion in Lying-in Women.

By C. Nepean Longridge, M.D.

Dr. Longridge read a short communication on the creatinin excretion of lying-in women during the most active period of involution of the uterus. The paper was based on ninety estimations of creatinin and 180 estimations of the total nitrogen in the urine. The patients were delivered in Queen Charlotte's Hospital, and were kept upon a creatinin-free diet during the time that they were under observation. The endogenous creatinin alone was estimated. It was found that the creatinin excretion maintained practically a level line, and is probably not increased by the involution of the uterus, a result which is in harmony with the recent work on creatinin excretion.

By applying the conception of autolysis to the process of involution of the uterus, it was thought that a clearer idea of that process might be obtained. A very brief résumé of the main facts concerning autolysis was given, stress being laid on the fact that it is most rapid in an acid medium and in a bloodless organ. Dr. Longridge had observed that the wall of an autolyzing uterus was acid in reaction and considered that the rapidity of the first stage of involution was due to this fact and to the fact that the uterus is anæmic during the first four or five days after delivery in a normal case. This anæmia is due to two factors: the retraction of the uterus and the effect of the kinking of the uterine arteries in reducing the blood-pressure in them after delivery.

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[1] *Proc. Roy. Soc. Med.*, 1907 (Obstet. Sec.), i., No. 1, pp. 5, 6.

Dr. Longridge thought that the conception of autolysis would help to explain many obscure points of uterine pathology, such as super-involution of the uterus and the changes in fibroid tumours, and would lead to considerable clarification of our ideas in regard to the relation of the liver to the toxæmia of pregnancy.

The PRESIDENT (Dr. Herbert Spencer) could not accept the author's supposition that there was no circulation in the uterus for four or five days after delivery; if so, why did it not slough and why did it bleed? Nor would he who had seen in Berlin Dr. Nagel's beautiful injections of the vessels of the puerperal uterus agree that the vessels were *kinked*.

Obstetrical and Gynæcological Section.

May 14, 1908.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

Death of Dr. Cullingworth.

THE President announced the death of Dr. Cullingworth, a Past President of the Obstetrical Society of London, and said that the death had inflicted a grievous blow on obstetrics and gynæcology and on the many friends of the deceased. He proposed that the following letter of condolence be sent to Mrs. Cullingworth:—

"The President, Council, and Members of the Obstetrical and Gynæcological Section of the Royal Society of Medicine take the earliest opportunity of offering to Mrs. Cullingworth and family their deep sympathy in the great loss they and the profession have sustained in the recent lamented death of Dr. Cullingworth."

The resolution was passed unanimously, with many expressions of sorrow and esteem from the members and visitors present.

The Supports-in-Chief of the Female Pelvic Viscera.

By R. H. PARAMORE, M.D.

(I.) THE CONNECTIVE TISSUES.

THE two great claimants concerned in this question are the pelvic visceral connective tissue and the pelvic diaphragm, of which the levator ani muscle forms the principal part. These, either separately or together, support the viscera from below. But the viscera are also maintained in their position by the application of a force from above, the intra-abdominal pressure; and in the erect posture their own weight, and the weight of the superimposed viscera, act in the same direction. Whilst the effect of gravity, however, is of little importance, because of the relative insignificance of its force, the intra-abdominal pressure, on the contrary, is of very great consequence, and it is mainly owing to the neglect of this important factor that misconceptions have arisen.

Recently considerable attention has been paid to the visceral connective tissue of the pelvis, and owing to its strength and toughness it has been regarded, both by anatomists and gynæcologists, as playing a principal rôle in the maintenance of the pelvic viscera in their normal position.

Thus last year (1907) no less than five papers appeared in the *Journal of Anatomy and Physiology* on the connective tissue, fasciæ and muscles of the pelvis. In the January number Professor Paterson describes "the suspensory ligament of the genito-urinary organs," which, he says, "arises from the general fascia as a crescentic fold in the neighbourhood of the ischial spine" and "extends across the pelvic cavity, forming on each side the suspensory ligament of the vagina and urethra."

In the July number Dr. Ovenden states the result of reinvestigations of the ligamentum transversalis colli, first described by Mackenrodt in 1895. She says:—

> There can be no doubt that in the dissection of the pelvis this band forms an easily defined and striking object. . . . Traced to its distal attachments, this band is found to be formed from strong fibrous connective tissue, continuous with that which surrounds the pelvic blood-vessels and also that which comes through the sacro-sciatic notch. Some of the fibres appear also to be attached to the sides of the third and fourth pieces of the sacrum.

As regards the central attachment:—

> The ligament is inserted partly into the vault of the vagina and the lateral fornix, but also directly into the side of the uterus for a short distance below the point of entrance of the uterine artery. It constitutes the tissue which is generally clamped or tied along with the uterine artery in the operation for vaginal hysterectomy.

Of the two papers by Derry (October), one is on "The Muscles of the Pelvic Floor" and the other on "The Real Nature of the So-called Pelvic Fascia." In the latter it is stated:—

> The viscera are all embedded in subperitoneal connective tissue. . . . This tissue is condensed in places to form definite ensheathing layers, particularly in the neighbourhood of the vagina and lower part of uterus in the female.
>
> . . . these layers . . . pass gradually into the general mass of subperitoneal tissue which fills the whole pelvic cavity, and are then no longer

> traceable; . . . it is quite distinct from that layer generally known as parietal pelvic fascia. . . .
>
> The suspensory ligament described by Professor Paterson as arising in the neighbourhood of the ischial spine is nothing more than the attachment in this position, *i.e.*, to the most posterior part of the "white line" of the subperitoneal connective tissue, which here envelops the vessels passing to the viscera, including the ureter and vas deferens.

The last paper by Cameron[1] has been sufficiently quoted in a recent contribution. In reference to this connective tissue Dr. Cameron says:—

> It may now be recognized that we have here a sort of fascial mesentery, which must constitute an effective support to the pelvic viscera.

Mackenrodt in 1895 showed that the upper part of the broad ligament can be cut through without causing any change in the position of the uterus, which only occurs when its deeper portion—the ligamentum transversalis colli—is divided (Whitridge Williams).

Dr. Ovenden says:—

> Both Emmet and Schauta have laid emphasis on the importance of the part played by this connective tissue in maintaining the normal position of the uterus.

On the other hand, Halban and Tandler[2] say:—

> Fritsch denied the existence of these structures, nor are we able to recognize their anatomical individuality.

It has recently been put forward by Dr. Fothergill[3] that the operation of vaginal hysterectomy reveals the nature of the real supports of the uterus, and the fact is offered that—

> until this (the tissue known as the parametrium) is divided on each side, the organ (uterus) is, for practical purposes, as completely supported as before any incision was made.

Dr. Fothergill continues:—

> The inevitable conclusion is that the vessels and other structures, with their sheaths or fascial coverings, which lie on each side of the uterus, below the broad ligament and above the lateral fornices, are the structures which support the uterus.

This statement is perfectly true as regards this particular case, but it cannot be accepted as applying universally. It is true that when the levator ani muscle is paralysed by a general anæsthetic and its anterior margins are strongly separated by weighted retractors or powerful assistants, that then this connective tissue, with its vessels and nerves, tends to keep, or keeps, the uterus in place. But because this is so in a particular case it does not therefore follow that it is universally true. And this is what Dr. Fothergill has assumed. On the contrary, when the levator ani muscle is not paralysed, and has not been previously injured, the muscle, which closes in the abdomino-pelvic cavity inferiorly, contracts to an extent reflexly demanded by the intra-abdominal pressure and the posture assumed by the individual, and so prevents the extrusion of these, the lowest placed viscera.

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[1] *Journ. Anat. and Physiol.*, 1907, xlii., p. 112.

[2] "Anatomie und Aetiologie der Genitalprolapse beim Weibe," 1907, p. 22.

[3] Fothergill: "Supports of the Pelvic Viscera," *Proc. Roy. Soc. Med.*, 1908, i., No. 3 (Obstet. and Gynæc. Sec.), p. 43.

If the conception put forward by Dr. Fothergill, and supported by other authorities, is really the true one—that the perivascular sheaths and connective tissue alone do support the pelvic viscera—it necessarily follows that these sheaths of connective tissue, except when the woman is lying down at rest, are subject to a continuous tension, which is sometimes greater and sometimes less. This is the result of (1) the action of gravity upon the pelvic viscera themselves; (2) the weight of the superimposed abdominal viscera upon them; and (3) the intra-abdominal pressure.

If, however, this conception is fallacious, and if the truth is that the pelvic viscera are maintained in their positions by the activity of the levator ani muscle, it necessarily follows that the parietal connective tissue which attaches this muscle to the skeleton is subject, except when the woman is lying down at rest, to a continuous tension, which is sometimes greater and sometimes is less; for the weight supported and the pressure resisted by the levator ani muscle is of necessity transmitted to its connective tissue attachments. Hence the question arises: If the visceral connective tissue, which passes from the pelvic wall to the viscera, is unable to support these viscera, how is it possible that the connective tissue attachments of the muscle are capable of doing so?

Now what is the value of connective tissue as a supporting agent in the living individual, and how does it behave in the presence of continuous tension?

First, as regards the supporting connective tissues properly so called, which unite the bones together, complete the skeleton, and by means of which the muscles are attached to the bones and to each other.

A study of the causation of orthopædic deformities shows that when momentary excessive forces spend themselves frequently on these tissues, or when ordinary and non-excessive forces are brought to bear upon them for prolonged periods of time, without intervals of rest, the connective tissues yield. And this results independently of their original strength and durability, and is dependent only upon the time during which the force is in operation.

Of the great variety of instances of this pathological fact occurring in the body, we may call to mind the linea alba in the latter months of pregnancy and the yielding which so commonly occurs from the continuous stretching of the abdominal wall.

To pass now from that variety of connective tissue which binds the muscles together to that other variety which connects the viscera with each other and to the (posterior) abdominal wall, we may for one moment consider what happens to the mesentery of the intestine with its contained arteries, veins, lymphatic vessels, nerves and supporting connective tissue when the gut becomes extruded into an inguinal, femoral, umbilical or any other hernia. Reflection at once shows how all these structures yield. Nor can any other result be expected when, instead of a local weakness in the muscular parietes, the weakness is general; and a universal hernia of the abdominal contents, forwards and downwards, into a pouched, distended, over-stretched, inefficient abdominal wall occurs. Enteroptosis is the result of a primary weakness in the entire muscular parietes (Keith). When the support, which the muscle in health gives, becomes lost, the other so-called supporting apparatus of the viscera—the so-called ligaments and the arteries with their connective tissue sheaths—has to bear the burden of the viscera, and is found to be totally inefficient for this purpose.

Next, we come to the connective tissue attachments of the uterus and the other pelvic viscera, with their arteries, veins, lymphatics and nerves, and to the question of what occurs when the muscular floor, which normally closes in the outlet of the pelvis, has become, for some reason or other, inefficient; in connection with which we wish to remark that, in the normal, non-injured muscle, as obtains in the great majority of virgins and nulliparous women, this closure of the pelvic outlet is as efficient and as effectual as the closure of the hiatus between the base of the thorax and the pelvis, which the anterior abdominal wall fills in.

There is no reason to suppose that some sequence, strangely different from what happens in other parts of the body, occurs here. The invariable result is a stretching and yielding of all the connective tissue attachments of all those viscera which become prolapsed into the deepened pouch formed by the receding, the thinned, the atrophied, and the inefficient muscle. Yet we are told that "the one constant essential cause of prolapse is relaxation of the perivascular sheaths" (Dr. Fothergill) (*ibid.*).

It is perfectly true that prolapse cannot occur without the relaxation of the perivascular sheaths. But the point is, that these sheaths are prevented from becoming relaxed, not by any virtue of their own, but by the support that is given to them, as well as to the pelvic viscera, by the tonically contracted and healthy muscle which lies beneath them. When this support has become inefficient, prolapse occurs in spite of the existence and the strength of this connective tissue.

A comparison of the connective tissue attachments of the levator ani muscle with the connective tissue attachments of the uterus and other pelvic viscera, quite apart from the extent and the strength of each, discloses the fact that the great and the only essential difference between them is that a muscle, composed of striated fibres, is interposed between the two lateral halves of the one set of connective tissue; whilst in the other, the visceral set, striated muscle fibres are entirely absent, and muscular tissue of the non-striated variety is so sparsely scattered through it that it can only be demonstrated satisfactorily and completely by microscopical examination.

In virtue, therefore, of the inherent peculiarity of striated muscle, that of marked extensibility and of subsequent recontraction of its fibres, the pelvic diaphragm, consisting of the levator ani muscle and its connective tissue attachments, the lateral pelvic fascia, is in reality a highly elastic obturator, capable of a considerable amount of movement in the cranio-caudal direction. In the healthy and sound condition, this pelvic diaphragm is in a continual state of activity, and as a result of the variations in pressure above, it is continually undergoing changes of tension. It is the consequence of the active production of these changes in tension (*i.e.*, the result of the relaxation and the recontraction of the muscle itself) that the physiological activity and anatomical strength of the muscle and of its tendons are produced.

It is to be remembered that when stretching occurs (*i.e.*, physiological paralysis from excessive tension), the muscle fibres yield first, and thus play the part of a safety valve to its connective tissue attachments. But this condition can seldom arise in the case of the undamaged pelvic diaphragm, because a force sufficient to cause such stretching is the outcome of a contraction of all the muscles enclosing the abdominal cavity; and there is reason to believe that the pelvic diaphragm is as capable of resisting any such pressure as the other muscles are capable of maintaining it. This theoretical consideration is substantiated by the clinical observation of the uncommon occurrence of prolapse in nulliparæ.

When, however, the pelvic diaphragm has been damaged by childbirth, the intra-abdominal pressure may very easily become too much to be borne, and the muscle will then give way. It is owing to the fact that the connective tissue (*i.e.*, parietal pelvic fascia) is in the early stages thus spared, that when the pressure is subsequently relieved (*e.g.*, by lying down), provided the stretching has not been too great or too long continued, the muscle is able to regain its tone and the prolapse may be spontaneously, and for the time being, cured. If, however, the muscle has been subjected to marked and continuous stretching, not only does it undergo an atrophic degeneration itself, but the same happens to its connective tissue attachments, which, besides stretching, also atrophy.

A reference to the living processes occurring in the body elsewhere confirms these statements. A good example, demonstrating how muscle fibres relax and stretch as a result of continuous tension, is shown in the treatment of cases of fracture of the long bones. When a weight is applied to the leg, after some little time the irritated and contracted muscles first relax and later stretch. This yielding of the muscle occurs before stretching of the ligaments of the knee-joint ; but the fact that these ligaments may stretch, if the weight be too great, is generally known.

In contrast to this unity of effect of overpowering force upon muscle and its connective tissue comes the fact that as the outcome of increased use of the muscles the connective tissue attachments of the same become stronger and more clearly marked. If the use is very considerable, yet not excessive, the muscle hypertrophies and so do the connective tissue attachments. A comparison of the bones from subjects of different muscular development shows quite clearly the truth of this statement. From a muscular man the bony ridges and other places where the muscles were inserted are all well marked ; from a weakly individual, however, the reverse is the case. The same results to the fasciæ and ligaments, by the medium of which the muscles are attached, as to the bones themselves.

From a consideration, then, of the actual relative anatomical conditions of muscle and of its connective tissue attachments found in the body, we are forced to the conclusion, indeed a reasonable one, that these are the outcome of the physiological functioning of the structures concerned, in which the connective tissue attachments play an entirely passive rôle ; and that these latter are entirely dependent upon the integrity of the muscle, with which they are connected, for their structure and strength—since hypertrophy of the muscle results in hypertrophy of its connective tissue attachments, and atrophy of the muscle in atrophy of its connective tissue attachments. It therefore follows that the connective tissue attachments of the levator ani muscle, upon which the strain of resisting and successfully opposing an increased intra-abdominal pressure is transmitted, themselves depend on the muscle for their strength and their capacity of performing this function; and that the successful resistance to increased tension of their fibres or pressure from above upon their surface is not the outcome of any inherent peculiarity it may be supposed they possess, but is the direct consequence of the activity of the muscle of which they form essential continuations.

It is interesting to read, in the paper by Professor Peter Thompson upon "The Arrangement of the Fasciæ of the Pelvis,"[1] that the fascia lining the pelvic wall above the attachment of the levator ani "is thicker, more aponeurotic and less transparent than the perineal portion, which is thinner and more membranous, allowing the underlying muscular fibres to be seen through it"; and, further, that this supramuscular or pelvic layer really consists of two superimposed sheets, the outer one of which is continuous with the perineal portion of the pelvic fascia (lining the outer wall of the ischio-rectal fossa), and an inner sheet which stretches from the origin of the levator ani up to the brim of the pelvis to be attached to the ilio-pectineal line. "It is evident," continues this author, "that the ilio-coccygeus is continuous with this aponeurosis, which, lying on the upper part of the obturator fascia, passes upwards to be attached to the ilio-pectineal line." Further on he continues: "Of the aponeurosis with which the ilio-coccygeus is continuous, I venture to suggest that it represents the upper fibres of the ilio-coccygeus and the investing fasciæ."

The fact that this fascia, as described by Professor Peter Thompson, is thicker and more aponeurotic than the fascia covering the obturator muscle is in favour of the opinion that the muscle of which it is the tendon is functional. If the ilio-coccygeus has lost its function in man, the aponeurosis, which forms its means of attachment to the pelvic skeleton, should be atrophied and inconspicuous.

Whilst, therefore, the pelvic diaphragm is a highly elastic membrane, the visceral connective tissue apparatus, which may be regarded as another incomplete superimposed diaphragm, is, on the other hand, little, if at all, elastic; whether considered from the point of its fibrous tissue or its non-striated muscle fibres. The only elastic element of any extent is that given by the arteries. This, however, can hardly come into play if the connective tissue strands, the perivascular sheaths, remain unstretched; whilst if the down thrust of the intra-abdominal pressure has been so great or so long continued as to cause stretching of these sheaths, it can scarcely be expected that the arteries will be able, subsequent to the relief or diminution of the intra-abdominal pressure, to raise the pelvic viscera into their former normal position; and for this principal reason, that the arteries themselves become stretched and lengthened in these cases, as a study of the descent of the kidney and of the uterus shows.

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[1] *Journ. Anat. and Physiol.*, 1901, xxxv., p. 127.

As a consequence of the non-elasticity of the visceral connective tissue diaphragm, in the meshes of which the pelvic viscera lie, it follows, when the pelvic diaphragm, which is placed immediately beneath, recedes, that the weight of the viscera and the intra-abdominal pressure will be brought to bear upon this visceral connective tissue apparatus. When this is in a healthy and sound condition, *i.e.*, has not been previously stretched, it no doubt is capable of sustaining this weight and pressure, if it be not too great, for some little time without impairment; for the connective tissues, visceral or parietal, do not immediately yield. This occurs normally during defæcation. When this act is about to take place the intra-abdominal pressure is first raised by a contraction of all the muscles enclosing the abdomino-pelvic cavity (diaphragm, abdominal wall muscles, and levator ani). At a certain point the contraction of the levator ani muscle is inhibited, probably owing to nervous impulses ascending from the rectum; then the muscle fibres lengthen, the pelvic floor descends, the angle of the recto-anal junction becomes straightened out, and the fæcal mass is extruded by the simultaneous coöperation of the contraction of the gut and the raised intra-abdominal pressure, which, as the act is accomplished, is suddenly relieved by the opening of the glottis. Finally, the levator ani muscle returns to its usual position. During the descent of the pelvic floor the connective tissue attachments of the uterus come into play and prevent a too great descent of this organ; and it is probably mainly owing to this recurring exercise, *i.e.*, the alternating conditions of relaxation and moderate tension, that their physiological activity and anatomical strength are maintained. This may explain, then, the strength of the ligaments. It also explains why the uterus is retained in position when the surgeon pulls upon the cervix in the operation of vaginal hysterectomy. The surgeon only exerts tension on these strands of connective tissue for a few minutes. The question is, What would happen if he continued to pull for days or weeks?

But if the frequently recurring down-thrust upon the unprotected visceral connective tissue is always or generally excessive, even though it be temporary, the connective tissue becomes impaired, yields and stretches; and subsequently, when the pelvic floor returns to its usual position, this stretching of the connective tissue remains. Thus the tissue becomes less and less capable of supporting the viscera in the temporary absence of muscular contraction. Hence it ultimately comes about that the viscera are not supported at all, and on straining marked descent occurs. This is the beginning of prolapse in those uncommon cases in which the muscle has never been injured by childbirth.

When, however, childbirth has occurred, which has either been difficult or tedious, and the pelvic diaphragm has been injured by the excessive stretching, either of the muscle or its connective tissue attachments, or both, probably causing a partial atrophy; then, subsequently, it is plain that this diaphragm cannot give the same support to the pelvic viscera, nor the same opposition to the intra-abdominal pressure. In consequence of this inability to meet the ordinary demands of its purpose, the pelvic viscera become thrust more and more downwards and occupy a deeper and deeper place, not so much from their own weight, nor from that of the viscera above them, but in chief as a direct result of the periodic and even moderate increment in the intra-abdominal pressure. Before the descent of this prolapse not only does the inefficient muscular diaphragm recede, but also the visceral connective tissue attachments lengthen. In short, the visceral connective tissue is dependent upon the efficiency of the pelvic floor for its integrity, and it therefore plays but a secondary part in the support of the pelvic viscera. Nor is it surprising to find that the behaviour of connective tissue here is subject to the same laws and principles which determine its activity elsewhere.

Halban and Tandler, in their book "Anatomie und Aetiologie der Genitalprolapse beim Weibe," 1907, sum up the value of the visceral connective tissue in the following way (p. 26):—

> Each structure which is connected with the uterus, and which in any way is attached to the skeleton of the lateral pelvic wall, represents in a certain measure a fixation apparatus of the uterus. No separate one of these factors has, of course, a predominant importance, but the result is determined by the harmonizing coöperation of all. If we examine the different speculative fixatory structures, now under consideration, we shall, indeed, find that they are not adapted, in

virtue of their physical peculiarities, to successfully resist a much increased tension or pressure. Each separate one possesses a certain elasticity and solidity, which, however, must not be estimated very highly. The elasticity of the smooth muscle fibres is, according to the measuring of Triepal, too trifling to define. Even anatomical examinations of prolapse show how extensible all these structures are, and, indeed, the same happens in pathological processes elsewhere. We need only mention the expansion of the peritoneum in herniæ, the stretching of the smooth muscle fibres in dilatation of the ventricle, &c., and the yielding of the connective tissue in different conditions.

Nevertheless, the separate structures are naturally in the position to sustain a correspondingly trifling weight, and it is to be attributed, no doubt, to the summation of the capacity of resistance of all the bespoken elements, that the weight of the uterus is supported and that it is maintained in its position. We must, however, be clear on this point, that all these fixation means of the uterus only function as fixation structures secondarily, and that they have primarily to accomplish other physiological purposes. Corresponding to this it ought not to be forgotten that they adapt themselves in their structure to the predisposed phylo- and onto-genetically determined position of the uterus, so that the fixation means are not a cause of the uterine position, but that their arrangement is to be regarded as a consequence of that position. Besides, anteversion is earlier existent ontogenetically, before a fixatory component can be assigned to the mesodermal tissue representing the fixation means (smooth muscle and vessels) from lack of that musculature. So also we see that, for example, in uterus unicornis and other maldevelopments, deviations of the fixation structures, entirely corresponding, are to be observed.

By means of the structures named the uterus is fastened by a system of strings to the pelvic wall and is maintained in suspension, just like the weight of a spider is supported as it rests on its system of threads, which are fastened to the neighbouring walls. This spider's web is able to bear the proper weight of the spider, but it is not capable of supporting a greater abnormal burden. But in relation to the fixation of the uterus its proper weight has not alone to be considered, but before all other factors the result of the abdominal pressure has to be reckoned with. The normal, not increased, abdominal pressure plays, therefore, no part; but, indeed, increase of the same. In the presence of this, the normal suspension means of the uterus is not sufficient.

(II.) THE INTRA-ABDOMINAL PRESSURE.

We must now turn our attention to this intra-abdominal or, more accurately, the intra-abdomino-pelvic pressure. This pressure depends on three factors: (1) the capacity of the abdomino-pelvic cavity; (2) the volume of the contained viscera and other contents; and (3) the condition of contraction of the muscular walls which surround and enclose it.

All these factors are variable. The capacity of the abdominal cavity is greatest when the spine is extended. On flexion of the spine the thorax approaches the pubes and the capacity is diminished. Permanent diminution is seen in cases of deformity of the lower dorsal and lumbar vertebræ, kyphosis and scoliosis; in these cases a glance serves to show that the whole base of the thorax is lower than it should be. It is also seen in emphysema of the lungs as a result of the lowered position of the diaphragm.

Likewise, the abdomino-pelvic contents are subject to fluctuations in volume; this increase may be temporary and frequently recurring, or it may be more or less permanent. Temporary increase is due to the ingestion of food, the production of flatus, the secretion of urine and its retention in the urinary bladder. Permanent increase is caused by an excessive deposit of fat in the omentum, mesentery and retroperitoneal tissue (lipoma), the presence of ascites, the growth of a tumour or of the pregnant uterus.

The muscles enclosing the abdomino-pelvic cavity are least contracted when the individual lies down at rest; most contracted when a violent movement is made.

Concerning this pressure I have the following data to offer, which I quote from an article on "Enteroptosis" by Professor Keith[1]:—

> In the erect posture there is a positive pressure of 20 mm. to 28 mm. in the rectum, and in the stomach 6 mm. to 12 mm. Hg. The increase of pressure in the rectum over and above that in the stomach is undoubtedly due, as Schwerdt points out, to the weight of the superincumbent viscera. The pressure exerted on the abdominal contents by the abdominal muscles maintaining one viscus against another may therefore be that estimated at 6 mm. to 12 mm. Hg.; but when the muscles of the abdomen are thrown into action it may temporarily be higher than the arterial blood-pressure. On stooping down and then lifting a heavy weight, the pressure within the stomach rises to over 70 mm., that within the rectum to 120 mm. Hg.; in coughing, straining and bending, temporary elevations of 50 mm. or 90 mm. Hg. are observed. In strong muscular men the intra-abdominal pressure may rise much higher, possibly to 200 mm. Hg.

(III.) The Levator Ani Muscle.

It is clear that the intra-abdominal pressure will act by tending to thrust the pelvic viscera still further downwards, upon the pelvic floor, and in the presence of an increased pressure reasons have been advanced to show that the visceral connective tissue is quite unable and inadequate to maintain the viscera in their normal position for more than short and infrequent periods of time ; and even then, if the pressure is always excessive, yielding occurs.

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[1] "System of Medicine," by Allbutt and Rolleston, 1907, iii., p. 860.

Since the intra-abdominal pressure is very considerably increased many times in each day, as for instance in coughing, sneezing, laughing and during defæcation, especially when difficult, the question arises, How is it that in the presence of this frequently recurring increased down-thrust, the pelvic viscera are maintained in position?

It has already been stated in an earlier part of this paper that the answer to this question is to be found in the existence of the levator ani muscle and its attachments.

We must now inquire somewhat briefly into the truth of this statement. In man the pelvic diaphragm consists of the pubo- and ilio-coccygei, which together form the levator ani muscle, and the coccygei. The disposition of these muscles is as follows : The superior fibres of the pubo-coccygeus, comprising the pubo-coccygeus proper, arise from the posterior surface of "the body of the pubis along an oblique line which extends from the lowest limit of the symphysis, upwards and outwards, towards the obturator canal, and also from the obturator fascia for a limited extent" (Thompson). They form a "flat band of muscle about 1 in. wide, thick at its mesial border, thin where it overlaps the ilio-coccygeus" (Thompson), which passes directly backwards and, uniting with its fellow of the other side, is inserted by means of a forked tendinous plate into the last sacral vertebra.

The inferior fibres of the pubo-coccygeus, having lost their connection with the coccyx and the ano-coccygeal raphé, unite with the corresponding fibres of the other side behind the perineal flexure of the rectum and below the tendinous aponeurosis which forms the insertion of the ilio-coccygeus muscle. Since these fibres embrace the rectum this division of the muscle has been called the "pubo-rectalis." It arises "from the back of the lowest part of the symphysis pubis under cover of the pubo-coccygeus, from the upper layer of the triangular ligament and from the pubes" (Thompson). When it contracts it draws the perineal flexure of the rectum forwards towards the symphysis, and thus, whilst it increases the natural bend of the gut, it also tends to obliterate its lumen. It has for this reason been called the "sphincter of the rectum" by Holl, who also refers to it as the best developed muscle in the pelvic diaphragm. At the same time its constricts the vagina, and this probably accounts for its better development in the female. Besides this relation to the rectum some of the most anterior and median fibres cross the middle line in front of the rectum and intersect with similar fibres of the opposite side, also with the deeper portion of the musculus sphincter ani externus, and with the posterior fibres of the musculus transversus perinei profundus in the perineal body (Luschka).

Behind the pubo-coccygeus and on a somewhat higher plane is the ilio-coccygeus muscle. It appears that this may arise in two distinct ways: (1) By means of its aponeurosis, the parietal pelvic fascia, from the ilio-pectineal line (Thompson); (2) by means of a fibrous arch slung from the os pubis to the ischial spine. This "white line" is in some cases found separated by some little distance from the pelvic wall, and when this is so a pouch, filled with fat, exists between the two. This "hiatus of Schwalbe" and this double origin of the ilio-coccygeus are described by Professor Elliot Smith in the *Journal of Anatomy and Physiology* for January, 1908, in a paper entitled "Studies in the Anatomy of the Pelvis."

I have on several occasions, when palpating the muscle, felt a tight fibrous-feeling band stretching from the pubis to the ischial spine. This I have supposed to be the tendinous arch of origin of the ilio-coccygeus; in some of these cases it has been found standing an appreciable distance from the pelvic wall. It is interesting to find that pressure on this band has caused the patient to complain of pain similar to what has been spontaneously felt at other times.

The muscular fibres pass downwards, backwards and inwards with varying degrees of obliquity, the most anterior ones passing more backwards than inwards, the most posterior being directed more inwards, but still backwards. They are inserted by means of an aponeurosis into the last two pieces of the coccyx and its tip, and into a median raphé from the coccyx to the posterior margin of the anus.

Behind the ilio-coccygeus is the ischio-coccygeus, or the coccygeus of human anatomy. It arises from the spine of the ischium and is inserted into the lateral margin of the lower sacral and upper coccygeal vertebræ. Although this muscle can have very little power over movement of the coccyx, it is of interest to find that it is composed of muscular as well as fibrous tissue, and must have, therefore, some other remaining, yet slight, function, *e.g.*, offering resistance to pressure from above.

These individual muscle sections of the pelvic diaphragm do not by any means form a uniform sheet in one plane, but overlap one another posteriorly where they join the corresponding muscle of the other side. By this means the part of the diaphragm posterior to the rectum is clearly strengthened. [Halban and Tandler.]

In the recent contribution to this subject,[1] already cited, the view has been put forward that the levator ani is a degenerated muscle, and that it is incapable of supporting the pelvic viscera. This plea was supported by two facts.

The first fact is that in the course of evolution the human being has lost the tail. From this the inference was drawn that the representatives of the tail-moving muscles in the lower animals had in man become so degenerate as to be useless.

It is true that with the loss of the tail the muscles have altered as regards their origins and insertions, and have either almost completely, as in the case of the coccygeus, or partially, as in that of the upper part of the ilio-coccygeus, represented by the parietal pelvic fascia, degenerated; and it is possible, if other evolutionary changes had not, concurrently with these alterations, been in process of development, that the levator ani would have disappeared altogether. But with the loss of the tail, the individual has assumed the erect posture, in which it is certain greater pressure is brought to bear upon the pelvic floor than in the horizontal position; and in order to meet this demand the remnants of the long tail-wagging muscles have undergone special adaptations, have become spread out to form a wide muscular sheet, upon the integrity of which the maintenance of the pelvic viscera is entirely due.

A study of the conditions obtaining in the lower animals supports this view. Thus Professor P. Thompson writes[2]:—

> In all mammals the closure of the "clefts" or "faults" in the pelvic floor, through which the rectal and genito-urinary canals are transmitted, is brought about by the action of muscular fibres; and the compact mass forming the floor of the pelvis is therefore, even in its simplest form, partly muscular; the rest is made up of connective tissue and integument. The muscular fibres, which form a distinct layer in the pelvic floor, surround the canals which traverse the "clefts," and they control or guard these canals at their outlet; in other words, the layer is largely sphincteric in action. It is obvious that a pelvic floor so constituted is not specially adapted for support.
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> But a great difference in the architecture of the pelvic floor is apparent in those mammals in which the long axis of the body is either absolutely or approximately vertical. In them the floor is further modified for the support of the abdominal viscera, and, in addition to the layer of muscle controlling the clefts, another is developed in the form of a well-marked diaphragm, which constitutes a muscular sheet attached on all sides to the walls of the pelvic cavity. In the human subject this sheet includes the levatores ani and coccygeal muscles. [Introduction.]

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[1] *Proc. Roy. Soc. Med.*, 1908, i., No. 3 (Obstet. and Gynæc. Sec.), p. 43.

[2] "Myology of the Pelvic Floor," 1899, p. 7.

The evolution of this pelvic diaphragm is interesting. It appears that "both the ilio-coccygeus and pubo-coccygeus are the result of a lateral extension on to the side wall of the pelvis from a single powerful flexor of the tail, situated on the ventral aspect of the sacral and caudal vertebræ." In some animals (monotremes and some marsupials) the three muscles are not distinct from each other. On the other hand, in others (mare and cow) they are not represented at all; and, therefore, in these no morphological equivalent of the levator ani exists. (Thompson). As regards the cause of this absence Professor Thompson says: " . . . it is by no means evident why suppression of certain of the caudal muscles should have resulted."

May not the explanation be found in the fact that in the animals referred to (mare, cow) the body is always, or nearly always, horizontal? And since the pelvic outlet, which is very obliquely placed, looking more upwards than backwards, is situated at a very high level in relation to the abdominal cavity—almost at its summit—it cannot have the same pressure brought to bear on it as it would have if the body were carried vertically; so that the weight of the viscera with their contents is sufficient, with the sphincteric muscles which are attached to the pelvis, to prevent any extrusion.

The second objection to the levator ani as a functioning muscle is based on Professor Thompson's account of it in his book.[1] This author, indeed, regards the ilio-coccygeus as a degenerated muscle; he says (p. 75):—

> Primarily, the muscle passes from the ilium to the caudal vertebræ—a condition retained in most mammals. But the reduction of the caudal vertebræ has been accompanied by a corresponding reduction in the muscles which act on them; so that the ilio-coccygeus in man is just as much a degenerated muscle as the coccygeus or abductor caudæ.

Further:—

> The action of the ilio-coccygeus must necessarily be feeble, and is practically limited to drawing forwards the coccyx and the fibrous raphé between it and the anus. When ankylosis occurs of the various pieces of the coccyx and of the coccyx with the sacrum, the action of the muscle is still further restricted.

But as regards the pubo-coccygeus the author takes a different view:—

> The pubo-coccygei are perhaps the most important muscles in the pelvic floor, since upon them depends the restoration of the floor to its normal position after it has been depressed by defæcation and parturition, &c.

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[1] "Myology of the Pelvic Floor," 1899, pp. 75. 76; 94.

Again:—

> The arrangement of the pubo-coccygei is admirably adapted for the support of the superimposed structures.

Concerning these statements I have the following remarks to make:—

(1) If the ilio-coccygeus is a degenerated and unnecessary muscle, why is it present in man, whilst it is absent in some other animals (mare, cow)? It is stated that "whereas in tailed apes the levator ani attains a thickness of more than 5 mm., in anthropoids it is thin and almost transparent" (Thompson). From which it may be thought, surely with some truth, that if loss of function and its attendant structural atrophy had commenced in these anthropoids, this latter would have reached a further stage in man.

(2) That the function of the muscle does not alone consist in raising the coccyx and the ano-coccygeal raphé, but also in presenting, by its contraction, a firm resistance to an increased intra-abdominal pressure; and that therefore, even in the presence of ankylosis of the coccyx itself, or of this to the sacrum, the function of the muscle and, therefore, its activity are not lost. That this is so is shown by the fact that muscular fibres are present, and can be easily seen, in the coccygeus, a muscle which certainly can effect no movement of the coccyx.

(3) That to function successfully as an opponent to the raised intra-abdominal pressure, the ilio-coccygeus has not to perform as much work to resist the increase in the pressure as the muscles of the abdominal wall have to perform in order to bring about the increase in the pressure.

For the sake of argument the diaphragm may be omitted, since, indeed, its position is maintained by the closure of the glottis, a trifling muscular act. And since the function of the pubo-coccygeus is to close the genital hiatus in the pelvic floor, its greater thickness and development are thus sufficiently accounted for, although, no doubt, from its median position, it plays an important part in the support of the viscera and the opposing of the intra-abdominal pressure. But it must be remembered that not all its fibres gain attachment to the vertebral column or to the fibrous raphé extending forward from this, but that a considerable portion, quite half the muscle or more, forms a loop around the rectum posteriorly, and thus can have no action in opposing increase of pressure from above. When the intra-abdominal pressure is raised, two definite muscular actions take place: (i.) Both parts of the pubo-coccygeus—*i.e.*, the pubo-coccygeus proper and the pubo-rectalis—contract, and lessen or obliterate the genital hiatus; (ii.) the pubo-coccygeus proper and ilio-coccygeus contract, and present a resistance to the descending viscera. This can be verified by palpation of the muscle; on getting the patient to cough the muscles will be felt to contract.

When the size of the pelvic outlet is compared with the area filled in by the anterior abdominal wall, reflection will show that the levator ani will have to perform much less work to oppose a force caused by the contraction of the muscles of the anterior abdominal wall than these muscles will have to perform to produce that force. We have here, indeed, the mechanism of the force pump. The small outlet is the pelvis, the piston is the levator ani muscle, the work to be done is the paralysis of the pressure produced by the extensive anterior abdominal wall; only in the body the levator ani remains more or less stationary in position, and its activity—that is its resistance—is increased or diminished according to the pressure that is brought to bear on it by the contractions of the other muscles.

It therefore follows that the muscles of the anterior abdominal wall (recti excluded) must of necessity be considerably thicker, *i.e.*, stronger, than the ilio-coccygeus; so the fact of the relative thinness and apparent weakness of the ilio-coccygeus is not a reason for rejecting the efficiency of the muscle, but it is what physical laws would lead us to expect.

(4) That in the examination of anatomical specimens of this muscle it is necessary to know something about the general muscular development and the age of the cadavers from which they were obtained, and whether childbirth had occurred, for a degenerate condition of both parts of the levator ani is not uncommon, as the frequency of cases of prolapse shows.

For these reasons I am not inclined to regard the ilio-coccygeus muscle as being such a degenerate structure as the quotations referred to would lead one to suppose.

Whilst it is difficult to allot the share that each of the principal parts of the levator ani muscle takes in the support of the viscera and opposition of the intra-abdominal pressure, we may in conclusion ask: What is the evidence for believing that this muscle as a whole performs this function?

(1) The muscle really exists, and preparations of it are to be seen.

(2) Ample evidence of the existence of the muscle and of its functioning is to be obtained in the living.

Dr. Fothergill[1] says:

> The narrow lower opening of the funnel-shaped pelvic diaphragm is not to be felt so often as descriptions would suggest; and in parous women it is often difficult or impossible to recognize the margin of the levator ani.

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[1] *Journ. Obstet. and Gynæc.*, 1908, xiii., p. 18.

I cannot agree with this statement. During the last six months I have paid particular attention to this question, and have palpated for the levator ani muscle in nearly every case I have examined, with the result that in the majority I have been able to feel it distinctly. The patients in whom it is difficult to feel are those who are very fat, the thickness of the fat in the ischio-rectal fossa masking any sensation that the muscle fibres might impart to the fingers. Whilst it is true that palpation is not delicate enough to reveal the presence of the thin inner and lower part of the pubo-rectalis, which passes to the perineal body, the mass of the pubo-coccygeus itself, which guards the cleft in the anterior part of the basin-like floor, can be distinctly felt. Finally, the ilio-coccygeus can be as easily palpated as the pubo-coccygeus, and its line of origin from the pubes to the spine of the ischium, frequently an easily palpable point, can often be clearly made out.

The method adopted is the simplest possible. Two fingers are inserted into the vagina and the thumb is placed over the skin of the ischio-rectal fossa; on bringing the fingers and thumb together the muscle is to be felt between them. The pubo-coccygeus is the more medianly and the more inferiorly placed (pubo-rectalis); by passing the fingers higher in the vagina and more laterally, and moving the thumb externally in the same direction, the ilio-coccygeus can be felt.

The levator ani is most easily palpable when it is best developed, that is, in nulliparous women who are not stout. The muscle is also to be felt in cases of prolapse. The presence of the muscle can be more easily made evident by getting it to contract. If the patient is asked to cough whilst palpation is being conducted the levator ani muscle will be felt to contract at the same time as the other muscles of the abdominal cavity.

(3) Finally, to quote again from Halban and Tandler, who speak as follows:—

> The proof that this musculature has, as a matter of fact, to perform this office, and that it is capable of performing it under normal conditions, is confirmed by the study of the pathogenesis of genital prolapse, for when the muscle under consideration becomes defective or insufficient from any cause, a displacement of the pelvic viscera invariably arises. The best example of this is furnished by cases of paralysis of the pelvic floor musculature, and this is to be observed in the most beautiful way in congenital prolapse in cases of spina bifida.
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> If the fourth sacral nerve is included in the sac of the meningocele, a congenital paralysis of the pelvic floor musculature results, and corresponding to this a pouch-like dilatation of the pelvic floor and a descent of all the pelvic contents, as well in the male as in the female subject, is produced.

This is principally manifested by the obliteration of the crena ani, the descent of the anal orifice, and the convexity of the whole perineum, as can be seen on inspection of the parts. On section it is proved that, as a matter of fact, the collective pelvic viscera are much more deeply placed than normal, and, moreover, in the female fœtus it accounts for the formation of a genital prolapse in consequence of the insufficiency of the muscular closing apparatus.

A case of this kind was shown by Dr. Russell Andrews before the Obstetrical Society in April, 1902,[1] but no adequate explanation was given for its occurrence. That the lesion is a nervous one is shown by the fact that paralysis of the legs and talipes are often present.

CONCLUSION.

It is therefore evident that the pelvic viscera are maintained in their position by two sets of forces. The one acts from above and pins, so to speak, the viscera in their places. This is the intra-abdominal pressure. The other acts from below, supports the viscera, and prevents them from being displaced by any excessive force from above. These two forces, therefore, vary directly with each other; increase of the one reflexly produces increase of the other. This mechanism is under a nervous control, which determines any desired end (coughing, defæcation, &c.).

As regards the force from below, this is supplied by the levator ani muscle. This is the essential element in the maintenance of a normal visceral position. When the pelvic floor is inhibited during defæcation, the visceral connective tissue is capable of supporting the viscera temporarily, but it is not capable of more than this. When the muscle has become insufficient this connective tissue is unable to maintain the viscera in position.

DISCUSSION.

Professor PATERSON (Liverpool), after a regretful reference to the death of Dr. Cullingworth, expressed his thanks to the Section for the opportunity afforded him of taking part in this debate. He had to thank a gynæcologist (Dr. T. B. Grimsdale) for first drawing his attention to the anatomical problems associated with cases of prolapse. He submitted that a great deal of sound anatomical work had been done in recent years in regard to the mechanical supports of the pelvic viscera, both before and since the publication of his own paper on the subject,[1] and made special reference to the work of Professor Peter Thompson on the muscles and fasciæ of the pelvic floor. With regard to the means of support of the pelvic viscera, he was inclined to lay little stress on the so-called "intra-abdominal pressure." That comprised conditions which varied with the size and form of the abdominal contents, and the conditions of, and the forces applied by, the abdominal parietes. Nor did he ascribe great importance to the power of the pelvic ducts, vessels, and perivascular connective tissue to maintain the viscera in position. The peritoneum and extra-peritoneal tissue he regarded as a kind of skin which, with the ducts, vessels, and nerves, had doubtless some feeble share in maintaining the pelvic viscera in their normal position. There were, however, two series of structures essentially responsible for the maintenance of normal conditions within the pelvic cavity. The structures comprising the pelvic floor formed, in his opinion, the chief factors in supporting the viscera—the symphysis pubis, triangular ligaments and compressor urethræ, perineal body, levatores ani and external sphincters, and the ano-coccygeal body. Any laceration or weakening of those structures would predispose to prolapse of the superimposed viscera. Again, within the pelvic cavity there were certain anatomical conditions to which attention had recently been directed which were of the utmost importance in the support of the viscera. In the first place he would insist that the rectum lies free and unattached (except to peritoneum, extra-peritoneal tissue, and vessels) in its course to the pelvic floor, where the anal canal begins. It is thus able to distend or collapse, and its lower part (rectal ampulla), when distended by fæces, is capable of serving as a support for the vagina and uterus. Similarly he considered the bladder and uterus essentially free and capable of distension or collapse in the fore part of the pelvic cavity. On the other hand, the genito-urinary passages—prostatic urethra or vagina and urethra—are bound down to the pelvic walls and floor in their course to the perineum. This is effected by means of a special investment of the pelvic fascia (suspensory ligament of the vagina and urethra), which, springing from the side of the pelvis in the neighbourhood of the ischial spine as a well-defined sickle-shaped fold, sweeps inwards to envelop the urethra and vagina, leaving a clear portion of the pelvic cavity behind for the passage of the rectum (rectal channel). This fold of pelvic fascia is very vascular; it separates into two layers, of which one sweeps across the middle line (recto-vaginal layer) and, separating the vagina from the rectum, is attached below to the perineal body. The upper layer has an attachment to the white line and becomes the lateral true ligament of the bladder. Below the bladder, in front, it becomes the anterior true ligament of the bladder on each side, and gains attachment to the symphysis pubis. The ligamentum transversalis colli of Mackenrodt is possibly represented by the free edge of this band of pelvic fascia, which gains attachment to the lateral fornix of the vagina. In his opinion there are two essentially different sets of conditions affected in prolapse of the pelvic viscera. Prolapse of the rectum is one thing; it may occur quite independently of lacerations or weakening of the pelvic fascia or levator ani, because the rectum is free and not moored by these structures above the anal canal. The viscera in the fore part of the pelvis, resting upon the more rigid parts of the pelvic floor, and having close connections with the pelvic fascia through this ligament, which binds down their ducts, may be the subjects of prolapse, through causes which produce lesions of the ligaments of pelvic fascia, the levatores ani or the triangular ligaments. The rectum may be prolapsed in spite of a healthy pelvic floor, the bladder or uterus only when the structures on which it rests are weakened and the floor gives way.

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[1] *Trans. Obstet. Soc.* (1902), 1303, xliv., p. 137.

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[1] "Mechanical Supports of the Pelvic Viscera" (read before the Toronto meeting of the British Medical Association, August, 1906), *Brit. Med. Journ.*, 1906, ii., p. 1701.

Mr. ARTHUR KEITH said that, as regards the chief conclusions reached by Dr. Paramore concerning the manner in which the pelvic viscera of the female are supported, he was in complete agreement. His investigations led him to infer that prolapse, partial or complete, of the pelvic viscera was primarily prevented by the action of the musculature of the pelvic floor. It was necessary to insist that they should clearly distinguish in this discussion two distinct problems: (1) the manner in which the uterus was maintained in its normal relationship to the pelvic floor; (2) the manner in which the uterus was maintained in its normal relationship to other pelvic viscera. It was with the first of these problems, he believed, they were then chiefly concerned. At the present time three structures were regarded as normal uterine supports: (1) the musculature of the pelvic floor; (2) the *visceral ligament* of the pelvic fascia, as described and defined by Professor Paterson; (3) the strong perivascular and perineural sheaths which surrounded the pelvic vessels and nerves; this third support was augmented by the free distribution of non-striated muscle in these sheaths and in the various folds of the broad ligament, the round ligament and the utero-sacral ligament, as well as the non-striated muscle found between the opposed margins of the levatores ani muscles. To ascertain the manner and extent to which each of these three sets of structures serve as uterine supports, one must realize not only the movements but also the forces to which the uterus and its appendages were subject. The attachments of the uterus must be loose enough to allow for (1) the filling, expansion, and emptying of the bladder; (2) the filling and emptying of the rectum; (3) its own expansion and movements in pregnancy; (4) the respiratory movements, for by the rectum one found that the pelvic pressure, when the subject was upright, fluctuated at each stage of the respiratory tide; (5) descent during forced respiratory movements, such as took place in coughing; (6) the descent of the pelvic viscera, which took place during forced body movements, such as stooping down to lift heavy weights (the pelvic pressure might then rise to 100 mm. or 150 mm. of mercury); (7) the pressure caused by tight-lacing, when the intestines were forced down on the pelvic viscera; (8) the deposit and absorption of fat in the pelvis. As regards the perineural and perivascular ligamentous supports, one found that they were sufficiently long to allow all of these movements to take place; it was only when the extreme limits of the movements were reached that these ligaments came into action. They served exactly the same purpose as the ligaments of such a joint as the shoulder: the humerus is kept applied to the glenoid cavity by the tonus of the shoulder musculature; it was only when the limits of normal movements of the humerus were reached that the capsule came into play and restricted the movement; it was only when the pelvic floor was relaxed or overcome by a too-powerful force acting from above—as when the musculature of the abdomen forced the abdominal viscera into the pelvis—that these supports could come into action. It was not to these perineural and perivascular fibrous supports that the primary duty of supporting the uterus must be ascribed. They served primarily to safeguard the blood- and nerve-supply of the uterus—to prevent the strain falling on the vessels and nerves when the normal limit of uterine movement had been reached. As regards the *visceral ligament* described by Professor Paterson, he would endorse the accuracy of his description, extending it somewhat by adding a point which had been observed and recorded independently by Dr. John Cameron and Professor Elliot Smith, namely, the continuity of the perivascular support with the *visceral* ligament, especially of the extremely strong fibrous sheaths surrounding the prostatic, vaginal and uterine veins with the visceral ligament on each side of the pelvis. But while agreeing with Professor Paterson that the visceral pelvic ligament was a separate, distinct entity, he differed from him as regards its primary function; to Professor Paterson it was the main supporting structure of the vagina, uterus and bladder, but to him (the speaker) the two visceral ligaments served primarily as a fixed base from which the musculature of the bladder and uterus acted during the expulsion of urine and the birth of the child. Much of their ignorance regarding the mechanism of the bladder (and the same is true of the heart) arose from their custom of studying the organ when it was removed from the pelvis. When studied in situ the longitudinal and expelling musculature of the bladder was seen to be fixed to and to act from the anterior or retropubic parts of the visceral ligaments. It would be remembered that the attachments of these ligaments to the wall of the pelvis corresponded to the white lines; as they reached the pubes they became approximated so as to bound laterally a triangular space; that triangular space corresponded to the trigone of the bladder, which, as was well known, had its own musculature and behaved, when the bladder was emptied, quite differently from the expelling musculature which acted from the visceral ligaments. The size and shape of the trigone, as might be verified by a study of the bladder in the child and in animals, corresponded exactly to the width of the vesical triangle bounded by the anterior or pubic parts of the white lines. As was well known, it was the trigone of the bladder which was most apt to become prolapsed, and this might occur without any elongation of the visceral ligaments, but simply by a yielding of the musculature of the trigone when the normal support of the trigone—the levatores ani and sphincter vaginæ—was injured or weakened. In complete prolapse of the uterus and bladder the visceral pelvic ligament of Paterson, especially its strong anterior parts, were elongated but slightly; the elongation and stretching affected the perivascular supports chiefly, but this effect was secondary to the prolapse yielding of the musculature. Professor Paterson had rightly insisted on the firm attachment of the visceral pelvic ligament to the vagina. When one conceived the traction that was thrown on the vagina during that period when the uterus was forcing the child through the vagina, the meaning of the ligament became very apparent. The visceral pelvic ligament was the fulcrum (fixed in its turn to the pubis) from which the uterine musculature acted in forcing out the child. Another circumstance must not be forgotten in discussing the fascial structures of the pelvis, one which had been emphasized by Professor Elliot Smith and by Dr. Derry. These writers have pointed out how the pudic vessels, as well as the prostatic and vaginal veins, were enclosed by strong sheets of fibrous tissue. Nowhere in the body did veins stand more in need of strong support, for nowhere were they subject to so great and so constant a change in pressure. One must not lose sight of the fact that the pelvic fascial extensions served as venous supports. This was especially well seen in connection with the prostatic and vaginal veins. One point, which appeared of great importance, had escaped observation, so far as he knew : that was the free distribution of pressure organs on the nerves which ended in the neighbourhood of the pelvic veins. The venous sinuses of the pelvis were apparently sites of afferent impulses regulating the tonus of the abdominal musculature. Having thus defined the functions of the fascial and ligamentous supports of the pelvic organs, he did not propose to enter into the manner in which the musculature of the pelvis kept the pelvic floor intact. He would mention only one or two points which seemed to him to be of importance. The manner in which a Hodge's pessary supported a uterus which tended to become prolapsed was simply by expanding and keeping expanded and rigid the vagina, whereby the damaged levatores ani, which could get no purchase on a flaccid vagina, could obtain a hold on and keep up a rigid vagina. It was useless to try and restore the action of a pelvic floor in which the muscle was already cicatricial and permanently damaged ; it was not possible to dissect out and restore by surgical measures a muscle which was, even in the body of a healthy normal female, difficult to expose and manipulate. If the muscle were damaged then it seemed to him the surgeon must fall back on the fascial and non-striated muscle supports, and these must be shortened and strengthened. Whatever means he employed, it was the shortening produced by inflammation and contraction of the pelvic subserous tissue which was effective.

Dr. W. E. FOTHERGILL (Manchester) thought it would be granted that the pelvic outlet was filled by a mass of structures lying between the peritoneum above and the external skin below, and that this mass consisted of a relatively movable portion (the uterus with its appendages, the vagina, the bladder and urethra) and a relatively fixed portion (the rectum, the pelvic diaphragm, the external or sphincter layer of muscles and the fascia, fat and other structures composing the pelvic floor). No great mental effort was required to suppose a division of all the structures between the movable portion and the fixed portion. The plane of division would run between the bladder and the pubes, between the anterior rectal wall and the posterior vaginal wall and, laterally, between the viscera and the sides of the pelvic diaphragm. Thus the uterus, vagina and bladder would lie free and loose within the pelvic diaphragm.

Could anyone suppose they would remain for any length of time in that position? A few movements of the bowels, and they would certainly be expelled. The levator ani and the external sphincter layer did not prevent the expulsion of the products of conception, nor of fæcal masses. Why should it be supposed that they could prevent the expulsion of the female pelvic viscera if these were not attached to the more fixed portion of the pelvic floor? The anatomical connection between the movable and the fixed portions of the pelvic floor did not consist of definite ligaments, but was formed by compound masses consisting of blood-vessels, lymphatics, nerves and other structures, together with the connective tissues investing them. Parts of this connective tissue were loose and parts were dense. The denser portions were the perivascular sheaths. Therefore the pelvic viscera were practically attached to the more fixed portion of the pelvic floor by the sheaths of their vessels. Therefore, the one constant and essential lesion in all cases of prolapse of the female pelvic viscera was elongation and relaxation of the perivascular connective tissue. The speaker had mentioned on a previous occasion, and need hardly repeat, that in numerous cases of injury to the pelvic floor there was no prolapse, and that, on the other hand, there were numerous cases of prolapse in virgins and nulliparæ. Given relaxation of the perivascular connective tissue, the loosened viscera gradually dilated the narrow opening in the virgin pelvic floor. Injuries to the perineum and levator ani were mere separable accidents favourable to prolapse. The causes of relaxation of the perivascular tissue were congenital defects, parturition and senile atrophy. These, therefore, were the important causes of prolapse. To mention intra-abdominal pressure as a cause of prolapse was like mentioning gravitation as a cause of falling through a broken plank—true, in a sense, but uninteresting. To speak of increased intra-abdominal pressure as a cause was equally unwise, for numerous women had prolapse without increased intra-abdominal pressure, and vice versa. Increased weight of the uterus was out of count as a cause of prolapse for similar reasons. Plenty of prolapsed uteri were very light, and many heavy uteri were not prolapsed. He would remark, further, that the view he advanced had the advantage that it explained retroversion, cystocele and vaginal prolapse as well as, and in proper relationship with, classical prolapse, for if the perivascular sheaths of the uterine vessels were alone affected, the fastenings of the bladder and vagina remaining normal, the result was merely a loose uterus. The physical sign of this condition was generally retroversion. Again, if the attachments of the bladder and vagina were relaxed, the fastenings of the uterus remaining normal, the result was cystocele and vaginal prolapse, the uterus remaining in its usual position. We could thus simplify teaching by describing a condition called "looseness of the pelvic viscera," caused by parturition, congenital defects and senile atrophy: and having as its essential lesion relaxation and elongation of the connective tissue sheaths of the vessels supplying the viscera. This condition would be said to occur in three varieties, namely: retroversion—relaxation of the upper part alone; classical prolapse—relaxation of the whole; cystocele and vaginal prolapse—relaxation of the lower part alone. Rectocele, it might be mentioned, was a special condition determined by pathological adhesion between the anterior rectal wall and the posterior vaginal wall in conjunction with deficiency of the perineum. It could, of course, occur either alone or together with looseness of the female pelvic viscera.

Professor PETER THOMPSON, whilst agreeing that the muscles of the pelvic diaphragm and the visceral pelvic fascia afforded support to the pelvic viscera, expressed the opinion that the pubo-coccygeal part of the levator ani acted as a support to the uterus and vagina, mainly in an *indirect* manner. It was well known that this division of the levator ani had two main actions: (1) It acted as a sphincter of the rectum, and (2) it compressed the lateral walls of the vagina and kept the passage closed. Whilst the vagina was a closed passage the pressure of the atmosphere on the pelvic floor was an important factor in maintaining proper support of the superimposed viscera, but when from any cause the levator ani was unable to exert its normal action on the vagina, the passage became an air-containing tube, the equilibration of the forces was destroyed, and prolapse might result.

Dr. HASTINGS TWEEDY felt that the author deserved their cordial thanks for the able manner in which he had brought the subject forward, and though they might differ from him in some of his conclusions they could not overestimate the value of his contribution. He had furnished them with anatomical data which clearly showed that strong ligaments crossed the lateral fornices and formed, in Dr. Ovenden's words, "easily defined and striking objects"; that they were of themselves capable of supporting the uterus in a normal position; that when they were severed the cervix sagged downwards—and this in spite of the fact that all the other uterine ligaments were uninjured. Despite these findings Dr. Paramore assigned to them an unimportant rôle as a uterine support, and his conclusions suggested that Nature had worked in a manner similar to that in which a shoddy bicycle was constructed, showing a massing of material in unnecessary places. There was convincing proof that these ligaments when acting normally kept the cervix tucked upward and backward, and when performing this function they were subjected to no greater strain than those which affected other similar structures, as, for instance, the liver ligaments. The levator muscle was essentially the muscle which kept the vagina from deformity, and, offering a counter-force to the intra-abdominal pressure, it enabled the anteflexed uterus to lie between these forces with little aid from its ligaments. If, however, the cervix descended it was powerless to maintain the uterus in anteflexion, nor could it do so if the uterus had once fallen into retroflexion. A tear of its pubo-coccygeal fibres would inevitably result in the occurrence of cystocele and rectocele, with slow descent of the cervix, but how frequently did such cases fall short of complete procidentia, even in elderly women, the obvious reason being that the transversalis colli ligament was intact? He had never seen a procidentia due to childbirth in which the cervix was not torn, nor could he call to mind an example of one illustrated in any atlas. His operative results furnished him with further evidence as to the importance of these ligaments and the futility of disregarding their presence in any procedure which had for its object the cure of uterine prolapse.

Dr. BRIGGS held, on both anatomical and clinical evidence, that the pelvic viscera were supported by (*a*) the levatores ani, (*b*) their dense lateral pelvic fasciæ, and (*c*) the perivascular and other loose cellular tissues. The integrity of the pelvic supports, like the integrity of a joint, did not depend upon ligaments. Fascial structures were purely passive and were maintained or restored by their muscles. The widening of the linea alba during the later months of pregnancy was corrected in vigorous women after labour by the tonicity and subsequent reapproximation of the muscular recti abdominales. Similarly, in planning operations in suitable cases of uterine prolapse, Dr. Briggs believed the restoration of the levatores ani and their fasciæ by extensive buried sutures in, under, and around the vaginal walls, without the removal of any tissues, still remained the main aim of the surgeon. Attacking so-called ligaments, if always practicable, or making a "new" suspensory ligament, always practicable by ventrofixation, was only to change the uterine axis. As the pelvic peritoneum could not be dealt with like the hernial sac generally, the operative treatment of prolapsus uteri rests upon the restoration of the muscular and fascial strata. He thought the discussion and Dr. Paramore's conclusions had not changed this aspect of operative gynæcology.

Dr. ALEXANDER MACPHAIL remarked that the full and complete contributions of other anatomists to the discussion had left very little of practical value to be added from that point of view. He would emphasize, however, the distinct attachment of the levator ani to the vaginal wall close to the cervix and the close connection established there with the visceral layer of the pelvic fascia, the latter probably being the more important in the matter of uterine support. It appeared to him that, in the course of the discussion, a tendency had been shown to wrongfully assign a supporting function to one set of structures to the exclusion of others; the *via media* of attributing this both to the "suspensory fascia" and to the "pelvic diaphragm" seemed to him to be the only sound course from the anatomical point of view. As to the priority of the lesion in these structures, in the incidence of prolapse, he had nothing to add from personal observation, nor had he been able to gather a definite conclusion from the experience of others; but it seemed to him that nothing short of the testimony of a watchman in the parametrium at the moment of its occurrence would justify dogmatic statements on the point. He congratulated Dr. Paramore on his stimulating paper.

Dr. MACNAUGHTON JONES said that he had most carefully read both the papers which had been before the Section, and, if the conclusions drawn by either Dr. Fothergill or Dr. Paramore were correct, then he had for years, when teaching anatomy, been misleading students, and he had been up to the present wrong and misleading in his writings. If it were true that the pelvic fascia was the sole factor in supporting the uterus he had been wrong, and equally misleading if the levator ani was the main force in effecting this object. However, he should candidly say that he was much in the same position as he was in before either communication was read. He still believed that there was a combination of forces at work in the pelvis in resisting any downward pressure on the uterus and maintaining it in its normal relation to the other viscera. The chief of these, no doubt, were the pelvic fascia and the levator ani. Nothing had been advanced which to his mind showed that either had the sole share in supporting the uterus. In regard to the perineum, it should be remembered that a perineum might appear untorn and the integument be intact and still the sphincter and levator be partially lacerated, and a concealed lesion of the levator ani exist. Much depended on the extent of the lesion. The principle of Noble's operation for repair of such partial lesions, as that of Kelly for relaxation of the vaginal outlet, was the fixing of the posterior vaginal wall to the anterior border of the levator border and securing fascial union in the middle line. When the levator ani was thus restored it fulfilled one of its functions—the closure of the vagina—thus assisting in the support from below given by the pelvic floor. The levator ani resisted *down strain,* as Dr. Paramore rightly maintained, but so did the pelvic fascia, and Dr. Paramore himself showed that he acknowledged this when he spoke of the effect of such strain on "the unprotected visceral connective tissue," which he said was the beginning of prolapse. He (Dr. Macnaughton Jones) preferred to believe with Halban and Tandler that the end was secured by the harmonizing coöperation of "all the factors which assist in making up the fixation apparatus." It was universally acknowledged that the suspension structures in the vault of the pelvis had but little power to prevent prolapse; still, they played a certain part, and clinical experience, as well as the results of operations on those suspensory structures, proved this. The views he expressed were those almost universally held on the Continent. It also was the very latest expression of American opinion as taught in 1907 in Kelly and Noble's "Gynæcology and Abdominal Surgery," in their description of the natural supports of the pelvic contents: "The chief structures contained in the pelvic floor which give support to the pelvic contents are the levator ani muscles and the deep pelvic fascia (triangular ligament), with its prolongation the vesico-rectal fascia." The pelvic fasciæ were sufficient for ordinary support; it was under extraordinary conditions of strain or otherwise that the levator ani muscles were brought into use. It seemed to him (Dr. Macnaughton Jones) that Goethe's lines well applied to the pelvic supports in the functions they fulfilled:—

Each on each in turn depending,
Each to each its being lending,
While each is giving on to each,
And each relieving each.

Dr. Inglis Parsons could not agree that the uterus was maintained in its position by the intra-abdominal pressure, with or without the pelvic floor. They all knew that intra-abdominal pressure was the chief cause of inguinal, femoral, and umbilical herniæ. How could they accept the view that this pressure, which forced intestine out of the peritoneal cavity, should exert a selective action on the uterus and do exactly the opposite by holding it in? So far from the intra-abdominal pressure holding up the uterus, it did exactly the reverse and forced it down, and was, in fact, the chief cause of prolapsus. The other chief factor, according to Dr. Paramore, in holding up the uterus was the pelvic floor. How did he account for those cases where the pelvic floor was ruptured completely and yet the uterus did not come down? He had just operated on a case of this kind in a stout woman, who had been going about for fifteen years without any sign of prolapse, although the pelvic floor was torn through into the rectum. Further than this, complete procidentia sometimes occurred in virgins with an intact pelvic floor, so that the pelvic floor, when at its best, did not always prevent prolapse, and when it failed to act, through rupture, it did not always bring on prolapse. Prolapse did sometimes follow rupture of the perineum and sometimes did not. The only explanation of this phenomenon was that the ligaments in some women were strong enough to keep up the uterus without assistance, whereas in other cases the ligaments were weaker and could not stand alone, but required the help of the pelvic floor. One of the speakers had suggested that the atmospheric pressure kept up the uterus to some extent. If there were a vacuum in the abdominal cavity this might be possible, but there was no vacuum; if there were, a woman would have to sustain a pressure of half a ton on the abdominal wall; besides, the cavity communicated with the external air through the Fallopian tube. As the pressure of the atmosphere was equal in all directions, it could have no effect, above or below, in keeping the uterus in position. Without being an egoist he might point to the results of his own operation of injecting the broad ligaments, so as to increase the strength of the utero-pelvic band. He had now done 150 cases, while other doctors in different parts of the world had also succeeded with the same operation in a large number of cases. This demonstrated that the uterus could be kept up by even one ligament if it were strong enough. At the same time repair of the pelvic floor did undoubtedly help matters, but was not necessary to success in all cases. It had been stated that Mackenrodt first described the ligamentum transversalis colli in 1895. This was not true. In 1882 Dr. Henry Savage, of the Samaritan Hospital, published his book on "The Surgical Anatomy of the Female Pelvic Organs," and stated (p. 69) "that after division of the utero-sacral ligaments, obstruction to prolapse is offered by the subperitoneal cellular tissue, particularly where it surrounds and accompanies the uterine blood-vessels." Again, on p. 26: "The utero-iliac cellular process accompanies the uterine vessels, forming a resisting fibro-cellular bond between the uterus and the sacro-iliac articulation." This ligament ought to be called Savage's ligament and not Mackenrodt's. It was on these observations by Savage and others that his (Dr. Parsons's) operation for repair of the utero-pelvic band was based. Dr. Clarence Webster also, in 1892, three years before Mackenrodt, stated in his book "On Researches in Female Pelvic Anatomy," p. 87, that the chief attachment of the uterus was the "connective tissue attaching the cervix to the side walls of the pelvis and also the muscular and elastic tissue in the same position." In conclusion, he would say, first, that the chief factor in supporting the uterus was the connective tissue with elastic and muscular fibres passing from the uterus in various directions to the walls of the pelvis, first described by Savage; second, that the pelvic floor also helped indirectly to keep up the uterus by preventing prolapse of the vagina; third, that intra-abdominal pressure did not keep up the uterus, but was the chief factor in causing prolapse.

Dr. GRIFFITH complimented Dr. Paramore on the value of his paper, which had drawn anatomists to take part in a discussion which, if of value to them, was of great value to the gynæcologists. At that late hour he would not occupy the time of the meeting with several points he would like to have raised. He would like to have placed before the anatomists two problems which had not been discussed that evening. Most members had talked of prolapse of the uterus, but the common prolapse was a prolapse of the anterior vaginal wall with a hernia of the adjacent portion of the bladder, often without any considerable prolapse of the uterus. What was the explanation of this? Secondly, it was usual in cases of considerable prolapse of the uterus to find the cervix, enveloped in the inverted vagina, protruding from the vulva. On measuring the length of the uterine cavity in this condition it was found elongated to as much as 5 in. or more. Within a few minutes of replacing the uterus it had shrunk down to about 3 in. This elongation was confined to the cervix, was due to stretching, and was impossible to attribute to pressure from above. What was its mechanism? There must be something to hold the body of the uterus firmly enough to resist the considerable tension which must exist to produce such stretching of so tough a structure. Dr. Griffith's view of the levator ani was that it was an auxiliary means for the support of the pelvic organs, put into action to resist special strains, while the general pelvic fascia, which formed a continuous sheet, varying in density in certain positions, was the chief support against ordinary conditions of pressure. He also thought that the levatores ani muscles might even facilitate prolapse when their lines of junction were torn through, their contraction helping to produce gaping of the enlarged orifice. It was quite clear that in women, as in men, the supports of the pelvic viscera were perfectly adequate to resist very great strain. As an example, he had seen in Ireland and Scotland young girls and women lifting and carrying heavy loads of peats which he himself had found difficult to lift from the ground, and he understood from medical men in practice in those districts that prolapse was not known among the nulliparous women. The injuries produced by childbirth were the great determining cause of prolapse. He divided all cases of prolapse into two groups: the common one, in parous women—this he termed *ordinary* cases of prolapse; a very small group in non-parous women—these he termed the *extraordinary* cases. He agreed with one of the speakers that occasionally cases of complete rupture of the perineum and sphincter ani of long standing were met with without there being any prolapse whatever; but it was quite clear that extensive ruptures undoubtedly facilitated prolapse. His experience did not lead him to agree with Dr. Hastings Tweedy that laceration of the cervix was an important cause. It appeared to him that it was merely a common phenomenon in parous women, and therefore common in cases of prolapse.

The PRESIDENT (Dr. Herbert Spencer) said that the Section was indebted to the author for his valuable résumé of the views held on the supports of the uterus and to the distinguished anatomists who had taken part in the discussion, and who had taken a wider view of the matter than that of Dr. Fothergill at a previous meeting. The truth appeared to be that the supports of the uterus were of composite character, including atmospheric pressure, muscle, ligaments and fasciæ. Some confusion, he thought, arose from speaking of the uterus being supported by *intra*-abdominal pressure; it was rather *extra*-abdominal or atmospheric pressure—the "retentive power of the abdomen" of Mathews Duncan. He was rather surprised to hear that the cardinal ligament of Mackenrodt was inserted only into the vagina; his own operative experience led him to believe that it was inserted into the cervix.

Dr. R. H. PARAMORE, in reply, said he wished to thank the President, Fellows, and members of the Section for the honour they had done him in receiving his paper and in listening to his remarks. Professor Paterson seemed to think he (Dr. Paramore) had belittled the work of anatomists, but this was far from the case. There was, of course, no doubt that anatomical research was of the greatest importance, but he wished to insist on the fact that it was impossible to ascertain the functions of structures by dissection alone, and that it was essential to investigate the actual living processes which occurred in the body to arrive at a satisfactory conclusion as regards this question. He wished to thank Professor Keith for his very valuable remarks and for the support he had given to his paper. Dr. Fothergill had said that in prolapse the connective tissues binding the uterus to the pelvic wall or pelvic diaphragm became elongated, and that this elongation was the cause of prolapse. He (Dr. Paramore) would like to ask Dr. Fothergill why these connective tissues became elongated. Dr. Fothergill had represented the pelvic diaphragm on the blackboard as a funnel and the uterus as vertical in position, with the cervix over the lower opening of the funnel; but this was far from the actual state of things in health. The pelvic floor was basin-like in shape, and not like a funnel, and the cervix uteri was normally in relation to that flattened-out part of the pelvic floor posterior to the genital fissure, which Halban and Tandler had called the levator plate. Dr. Hastings Tweedy had appeared to take exception to the views he (Dr. Paramore) held, but he (Dr. Paramore) was glad to find that there was no essential difference of opinion between them, and that, in fact, their views were in accord. Dr. Hastings Tweedy had said that when the uterus was anteflexed then it was supported by the muscular floor of the pelvis. This was what he (Dr. Paramore) had endeavoured to show. When, however, retroversion occurred, and the uterus occupied a position in which its long axis was in the same straight line as that of the vagina, very different conditions were produced. Whilst in anteversion the abdominal pressure still further increased the anteversion and pressed the cervix downwards upon the deepest and strongest part of the pelvic floor (post-anal part), when the uterus was turned backwards then the intra-abdominal pressure spent itself upon the fundus only; for the force exerted on the anterior wall of the uterus was equalized by that exerted on the posterior wall, and that on the left side by that on the right. Whilst the pressure on the fundus pressed the uterus downwards there was no equalizing pressure exerted upwards upon the cervix, but the uterus was prevented from immediate descent by its attachment to the pelvis by the transversalis colli ligaments. Dr. Hastings Tweedy had laid much emphasis on these ligaments and had said that they maintained anteversion by keeping the cervix uteri drawn upwards. He (Dr. Paramore) disagreed with this view and thought that anteversion was maintained by the intra-abdominal pressure exerting itself upon the posterior surface of the uterus, and that the cervix was prevented from descent, not by the ligaments mentioned, but by coming into contact with the "levator plate." This, at any rate, was Halban and Tandler's view. He thought that these ligaments prevented a descent of the cervix during defæcation, when the pelvic floor was inhibited. The view he took was, he thought, supported by the fact that in retroversion these ligaments were unable to maintain the uterus in position, and descent of the organ frequently occurred. This was the cause of prolapse of the uterus in nulliparæ. In these cases the uterus was always found retroverted, and on examination the cervix was found protruding from the vulva without any prolapse of the vaginal walls. This explained the remark made by Dr. Macnaughton Jones, that elongation of the cervix was frequently associated with prolapse. The elongated cervix insinuated itself downwards in the vagina and favoured a retroversion of the body, which the ligaments, in spite of their strength, were unable to prevent descending. Dr. Hastings Tweedy, in support of his contention that these ligaments were of great importance, drew attention to the operative treatment of prolapse. He (Dr. Hastings Tweedy) said that if these ligaments (transversalis colli ligaments) were divided and stitched together in front of the cervix good results followed. Whilst he (Dr. Paramore) was unable to speak of the good effects which were said to follow this operation, he had no doubt, from theoretical considerations, that it was a good operation—perhaps the best—for these cases, but he did not believe it acted by suspending the uterus. This operation was similar in its results to the other operative measures undertaken in prolapse: ventrosuspension, ventrofixation, the Adams-Alexander operation, and the intra-abdominal shortening of the round ligaments. All these operations were followed by good results in prolapse, but none of them acted by supporting or suspending the uterus. The uterus, if it was maintained in its normal position subsequent to the operation, was supported by the levator ani muscle. If this muscle was inefficient, prolapse recurred in spite of the operation. This was shown by the fact that after ventrofixation, even when the fundus uteri was adherent to the anterior abdominal wall, when the pelvic musculature remained inefficient and when the intra-abdominal pressure was periodically raised sufficiently high, the cervix uteri again descended and again protruded from the vaginal orifice. Although he had not seen any cases operated upon in the way Dr. Hastings Tweedy advised, it was suggestive to find that Dr. Fothergill,[1] who advocated the same operation, invariably recommended that a posterior perineorrhaphy should be done. Dr. Fothergill had given no adequate reason for the performance of this perineorrhaphy, and he (Dr. Paramore) would be glad to know the subsequent history of a case operated upon in this way without any operation upon the inefficient pelvic floor. This would soon show the value of shortening the ligaments alone. But he believed that when posterior perineorrhaphy was performed, the deep stitches invariably included the muscles, and thus the actual floor was strengthened. All the operations referred to acted by bringing about anteversion of the uterus, a condition of the greatest importance in the prophylaxis and treatment of prolapse. But the uterus and other pelvic viscera were maintained in their position, *i.e.*, in their level, by the support given to them by the muscle placed beneath. Dr. Paramore thought Dr. Inglis Parsons had misinterpreted his meaning. He (Dr. Paramore) had indeed said that "the viscera are also maintained in their position by the application of a force from above, the intra-abdominal pressure," but he did not mean that this force acted by suspending or sucking up the viscera, but that, on the contrary, it acted by pressing the viscera downwards upon the pelvic floor. He thought he had made this meaning sufficiently clear, for further on in his paper he had shown the analogy between inguinal hernia and enteroptosis and the two great varieties of prolapse: (1) the hernia of the viscera through the aperture which the pubo-rectalis muscle surrounded, and (2) the subsidence of the whole pelvic floor, in which a condition comparable to enteroptosis was produced. He did not believe a vacuum existed within the abdominal cavity, nor had he said or inferred this; on the contrary, he had shown, by quoting from Professor Keith's article on enteroptosis, that the pressure within the abdomen, so far from being negative, was usually positive, *i.e.*, greater than the atmospheric pressure, and that on active and much more on violent movement this pressure was considerably increased. It was during these active movements that the levator ani muscle contracted, and by its contraction presented a resistance to the downward thrust of the viscera and thus maintained them in their normal position. Reference had been made by speakers to rupture of the perineum, and Dr. Parsons had said that the pelvic floor might be ruptured right up to and into the rectum without the occurrence of prolapse. [Dr. Paramore endeavoured to show by means of a diagram the explanation of this fact.] There were two muscular slings surrounding the vagina; one was the main mass of the pubo-rectalis muscle, which embraced not only the vagina but also the rectum; the other consisted of the prerectal fibres of the pubo-rectalis, which were inserted into the ano-vaginal raphé and only embraced the vagina. Piquand and Hue, in a recent contribution[1] to this subject, had called special attention to these fibres, which they described as the "réléveur pubo-vaginal." It was these fibres that were torn when the perineum was lacerated, but it was to be noticed that when the laceration extended into the rectum, the main mass of the pubo-rectalis, which passed behind the rectum, was not involved in this tear. Whilst this part of the pubo-rectalis was hidden from view, and was so seldom palpated that it had been stated it could not be felt at all or very rarely, the perineum, on the other hand, was visible to inspection. He (Dr. Paramore) believed that the main mass of the pubo-rectalis was of the utmost importance in preventing the escape of the pelvic viscera, and that when a hernia occurred it was due to an injury of this muscle. The prerectal fibres were of very little importance, and, indeed, a comparison of these two muscular slings of palpation in the living would show that whilst the postrectal fibres formed a large muscular mass which could easily be traced along the lateral wall of the vagina and around the rectum posteriorly, the mass of tissue discovered in the perineal body by means of one finger in the rectum and another in the vagina[1] was, even in nulliparæ, extremely and surprisingly small.

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[1] Edin. Obstet. Soc., March, 1908 (*Lancet*, 1908, i., p. 941).

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[1] *Rev. de Gyn. et de Chir. abd.*, 1908, xii., p. 3.

A Case of "Womb Stone."

Exhibited by J. ABERNETHY WILLETT, M.D.

(For J. PRESTON MAXWELL, F.R.C.S.)

THE patient, a healthy-looking woman aged 35, presented herself at the Engchhun Hospital, Fuhkien Province, South China, complaining of a foul discharge from the vagina and a lump blocking the vaginal outlet. It proved difficult to extract, but was finally removed with the aid of a cephalotribe, and is shown here to-night.

The history of the case is as follows: Menstruation commenced when aged 14, and was regular up to the time of her marriage, at the age of 20. When aged 22 she was delivered of a female child, which lived till it was aged 7 and was then carried off by plague. When aged 30 she had another apparently normal pregnancy, but the child was born dead, having died just before or during labour. Six months later she again became, as she supposed, pregnant. There had been one period four months after the birth of the last child, normal in every way. She had never had morning sickness in her pregnancies, so that this point does not aid one in any way. For five months she thought that she was having a normal pregnancy and prepared for the child's arrival; but she never felt any fœtal movements, and she is not clear as to the earliest date at which these were felt in her former pregnancies. At the end of five months, as she calculated, she had a bad fall, but the abdomen was not struck. From that time the abdomen ceased to enlarge, and after a month or two it was clear to her that it was becoming smaller, but a lump remained in the hypogastrium till six months ago. Six months after the fall she began to have a discharge from the vagina which soon became foul and sometimes contained blood, and this condition has continued for the last three and a half years. A few weeks back the lump in the vagina became apparent to her and troublesome, and she tried to remove it without success.

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[1] The examination is best performed by using the forefinger of each hand simultaneously.

On examination after the removal of the tumour the cervix was low down and fixed to the left, and deeply cleft in this region. The body of the uterus was slightly enlarged, but no fibroid nodules could be felt either in the body or cervix, and the body was movable. The sound passed the usual length. A few days later the discharge had entirely ceased and the patient was well. During her illness she had mostly been up and about, but fit for nothing, and very miserable at times. The Chinese are notoriously inaccurate as to dates, but I have been able to get these points confirmed by her relatives.

Two Examples of the Encapsulation of Sterile Fluid in connection with the Fallopian Tube and the Ovary.

By J. Bland-Sutton, F.R.C.S.

A spinster, aged 35, was submitted to cœliotomy by an experienced surgeon for enlargement of the abdomen due to an effusion of fluid (hydroperitoneum). After the fluid had been removed a fibroid about the size of a cricket-ball was detected in the uterus, and as this tumour had given rise to no trouble it was not interfered with. No particular attention appears to have been paid to the Fallopian tubes or the ovaries, although at the time of the operation the disease was regarded as tuberculous peritonitis; nor is there any evidence available to indicate that any steps were taken to demonstrate the presence of the *Bacillus tuberculosis.* Five years later the patient came under my observation on account of a large abdominal tumour reaching well above the navel and furnishing the usual signs of a uterus enlarged by fibroids. The patient was frail and ill, and, menstruation being profuse, she was anxious that something should be done for her relief.

In the spring of 1906 I opened the abdomen and found the uterus occupied by fibroids; the ovaries and Fallopian tubes were not only enlarged and closely adherent to the lower parts of the uterus, but were so blended as to make it difficult to distinguish the ovaries and tubes from each other. I succeeded in removing both ovaries and tubes, and performed a subtotal hysterectomy. The patient made an afebrile recovery, and when last heard of was stated to be in good health.

On examining the ovaries and tubes a curious condition was revealed. A globular yellowish body intervened between the ovary and the mouth of the tube; the relation of the tube to it seemed as if the mouth of the tube was endeavouring to engulf this globular body, like a snake swallowing an egg. As the condition appeared uncommon I took one tube and ovary to the bacteriologist, and the other I hardened and subsequently divided in its long axis, as shown in fig. 1. In this way it could be demonstrated that the ovary contained several loculi filled with caseous stuff, and similar caseous matter occupied the ampulla of the tube. The globular body between the tube and the ovary is one of those curious adventitious capsules (with which we are now so familiar in connection with tubal abortion) which had formed around a collection of caseous material, which had probably slowly exuded from the cœlomic ostium of the tube.

The parts entrusted to the bacteriologist were submitted to a thorough examination, including injections into rabbits, but all with a negative result.

It is a matter for regret that no positive evidence is forthcoming concerning the bacteriological condition of the fluid removed at the first operation, but the facts do seem at any rate to suggest that this may have been a case in which a tuberculous peritonitis was cured by cœliotomy and removal of the fluid. The presence of a pseudocyst, or adventitious capsule, at the mouth of the Fallopian tube is a favourable sign, for such only form when the exudation is sterile.

The endometrium was normal, and there was nothing suggestive of tubercle in any part of the uterus.

In its bearing on the formation of capsules around an aseptic exudation the following case is interesting. A married woman, aged 30, mother of one child, experienced such acute and sudden pain in the pelvis at the onset of a menstrual period that she sent for a doctor. The pain, its relation to menstruation, and the presence of a definite lump in the pelvis behind the uterus induced him to believe that the trouble was probably due to the rupture or abortion of an early tubal pregnancy. The patient kept at rest in bed for several days, till the acute pain subsided, but at the end of three weeks she complained of pelvic pain, and the lump in the recto-vaginal pouch not only remained tender, but had increased in size. I was asked to see the patient, and thought there could be little doubt that the pelvic lump was in reality a gravid tube, and recommended the patient to have it removed. At the operation a few days later the lump on the floor of the pelvis proved to be an enlarged ovary, with a red body larger than itself projecting from its side and obviously full of blood. I at once imagined that we had to deal with a primary ovarian pregnancy; so the parts were placed in a preservative solution for a week and then divided. On careful examination I was able to satisfy myself that the body attached to the ovary was an encapsuled collection of blood which

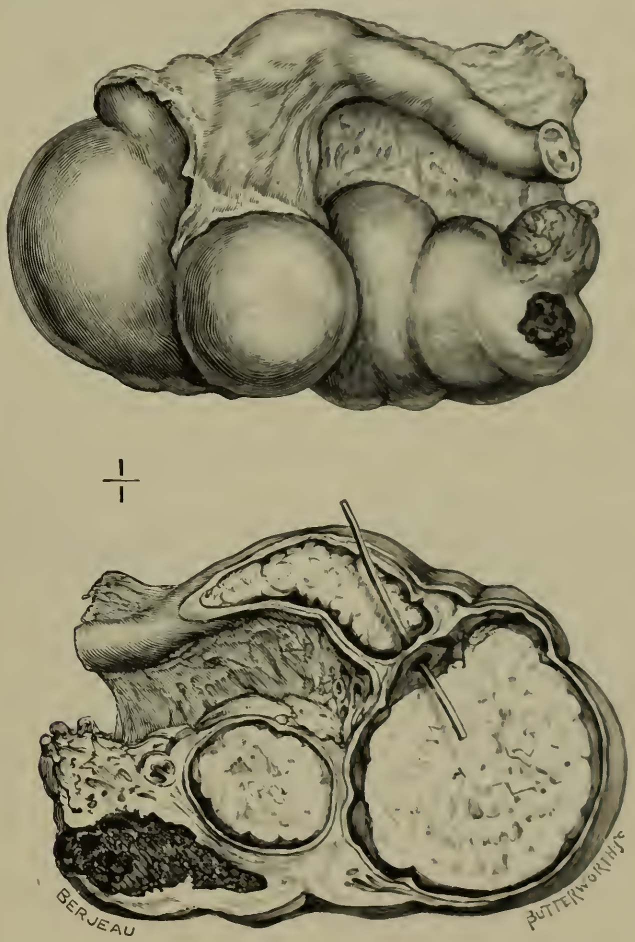

Fig. 1.

An ovary and tube filled with caseous matter; between the ovary and the mouth of the tube there is an adventitious cyst also filled with caseous matter. The parts are shown entire and in section.

had leaked from an unusually large corpus luteum. Portions of the capsule and clot were examined microscopically, but no traces of embryo or chorionic villi were detected. The relation of the encapsuled blood to the corpus luteum is shown in fig. 2.

It is quite common in the course of pelvic operations to find large thin-walled ovarian follicles or a recent corpus luteum filled with blood projecting from the surface of the ovary; but if the drawing be carefully scrutinized it will be seen that the corpus luteum is complete except at the small perforation in its wall through which the blood escaped.

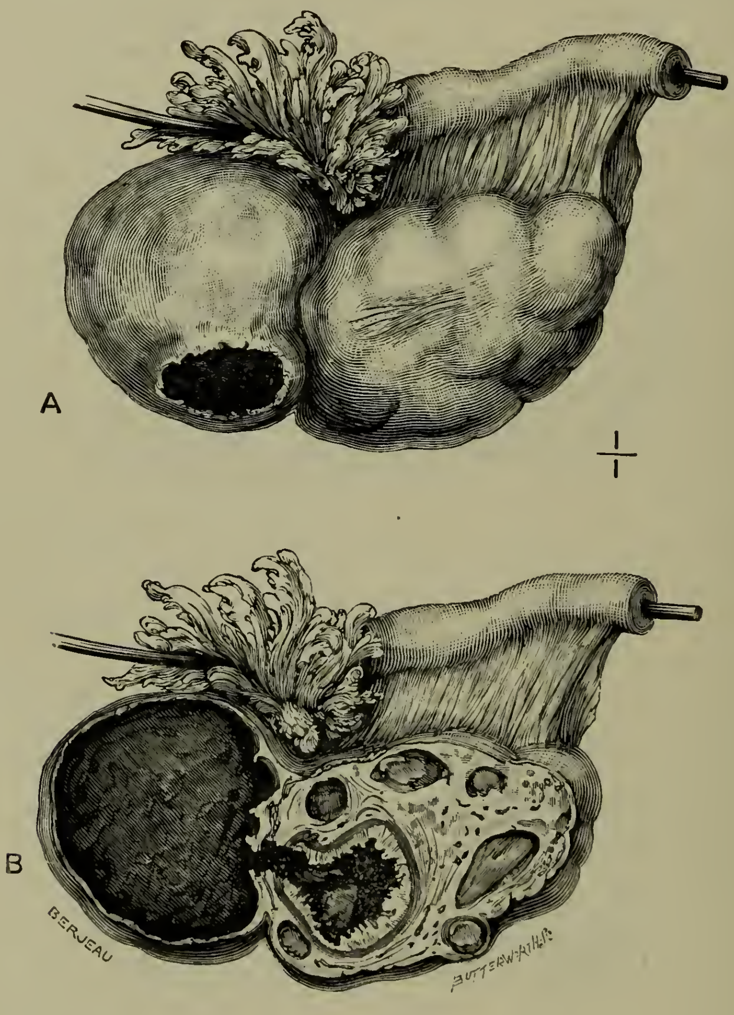

Fig. 2.

An ovary in section, with an encapsuled collection of blood derived from a corpus luteum. Before removal the enlarged ovary was regarded as a gravid Fallopian tube.

A The parts entire. **B** Ovary and cyst in section.

Moreover, the wall of the adventitious capsule is devoid of lutein tissue. I have examined a number of specimens in which the ovary contained a cyst filled with blood, so as to avoid missing an early ovarian pregnancy, but this is the first example that has come under my notice in which blood leaking from a large corpus luteum has become encapsuled. The manner in which the signs simulated an early tubal pregnancy is perhaps noteworthy.

A Case of Sarcoma of the Uterus.

By J. BLAND-SUTTON, F.R.C.S.

MY experience of sarcoma of the uterus is very small, but it serves to show that this form of malignant disease manifests itself in the body of the uterus in two forms: a sarcoma may arise in the uterus as an encapsuled tumour which, in its naked-eye and microscopic characters, is indistinguishable from a moderately firm interstitial fibroid; or, it occurs as an irregular, diffuse, nodular growth throughout the uterus. The specimen, the subject of these remarks, belongs to the latter form.

A spinster, aged 27, complained of painful and irregular menstruation, which so much interfered with her official work that she willingly submitted to examination under an anæsthetic. On the right side of the uterus, close to the right cornu, a soft knob of the size of a walnut could be made out, and was considered to be a sessile subserous fibroid. The uterus was carefully dilated, but appeared to be normal within.

Three months later I saw the patient again, because the hæmorrhages were even more profuse and painful than before the dilatation, but, what was more significant, the uterus had greatly increased in size and could now be felt above the pelvic brim. The nature of the case had become clear enough, and the patient was recommended to submit to the removal of her sarcomatous uterus. To this she assented, and the hysterectomy was followed by a good recovery.

The uterus (fig. 1) has the appearance as if covered with many subserous sessile fibroids, but when fresh they were soft, elastic, and easily compressible. On section, the most striking feature about the tumours was the complete absence of capsules; and after the uterus had been hardened, tracts of sarcomatous tissue, also lacking in capsules, appeared on the cut surface of the organ. In order to show the indefinite manner in which the sarcomatous tissue is mixed up with the uterine tissue, I have had some thin sections cut in such a way as to include the whole thickness of the uterus; these were stained and mounted as transparent sections on glass (fig. 2).

Microscopically, the abnormal tissue consists in the main of spindle-cells, but they simulate so closely the cells found in many simple benign fibroids, even to the whorled arrangements of the tracts of tissue, that anyone examining the sections under the microscope, without a knowledge of the clinical facts, and ignorant of the absence of encapsulation of these nodules, would have difficulty in deciding whether the abnormal tissue should be regarded as benign or malign.

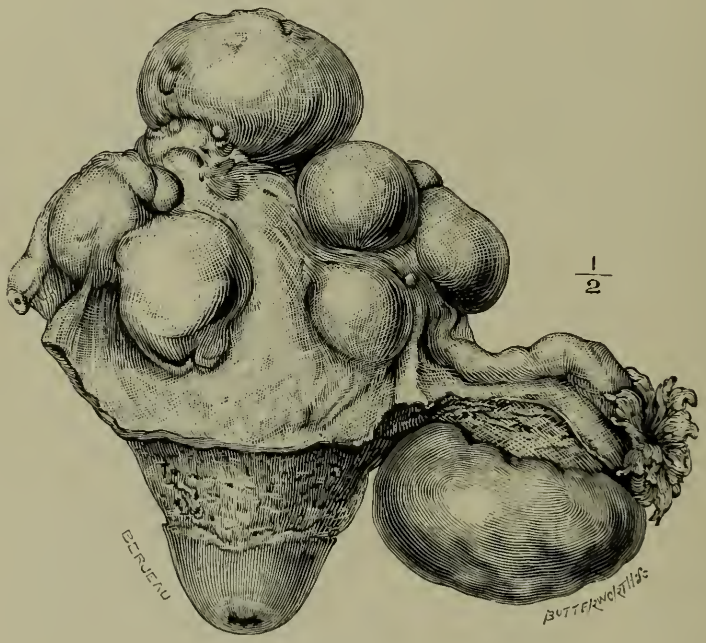

Fig. 1.

Uterus beset with sarcomatous knobs resembling subserous fibroids.

I have ventured to bring this specimen under the notice of the Section for a specific purpose. At the outset I stated that my experience of uterine sarcoma is very small. I hold strongly the opinion that sarcoma of the uterus is an uncommon disease, and have always been sceptical in regard to what is called sarcomatous degeneration of a fibroid. It is certain that sarcoma may arise in the uterus as an encapsuled tumour, and so closely simulate in its naked-eye and microscopic characters a benign fibroid as to deceive the most cautious and experienced surgeons and pathologists. Even these dangerous tumours are rare. Diffuse sarcomata such as the one which is the subject of this communication are, according to my experience, very uncommon. Unfortunately, even in these cases, hysterectomy avails little, but it relieves pain, at least for a time.

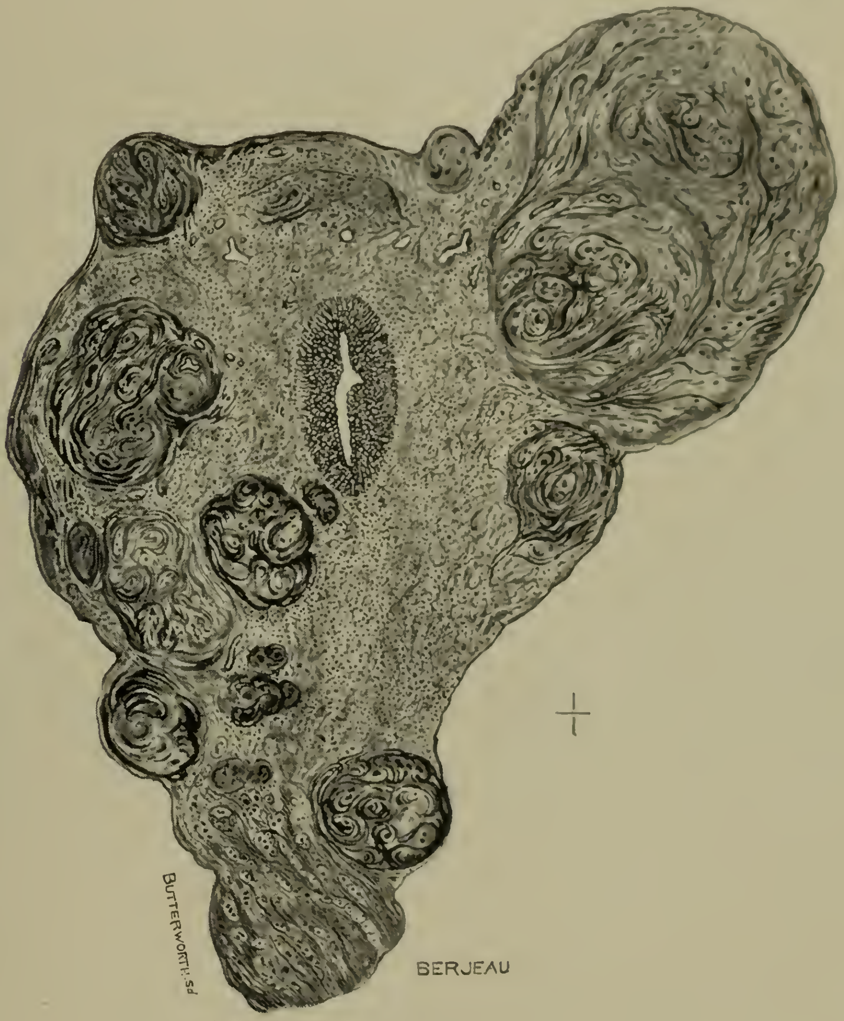

FIG. 2.

Section through the uterus showing unencapsuled collections of sarcomatous tissue in the uterine wall.

Report of the Pathological Committee.—We have examined this specimen, with the microscopical sections supplied, and are of opinion that on the evidence before us the microscopical appearances are indistinguishable from fibro-myoma. Some of the tumours are encapsuled, but many have no distinct capsule. The Committee is of opinion that it is a fibro-myoma.

DISCUSSION.

Dr. AMAND ROUTH asked if the acute pain described by Mr. Bland-Sutton as a marked symptom in his case was paroxysmal. He had recently shown two specimens of sarcomatous uteri removed from patients and had had a third case since, where severe pain coming on at a fixed hour daily, lasting a few hours, was a marked clinical feature, and he was inclined to attach importance to it as of diagnostic value.

Dr. MACNAUGHTON JONES said that there could be no doubt that a sarcomatous tumour was one of the rarest of all forms of uterine growth. From 2 per cent. to 4 per cent. was the estimate of the proportion of sarcoma, even to other malignant degenerations. He had seen but two cases of true sarcoma of the uterus. One occurred some years since, and microscopical examination showed it was a sarcoma of the endometrium. In the other the primary growth was in the vagina, but it invaded the uterus. At Heidelberg, Professor Schroeder had shown him a specimen of sarcoma in which the degeneration was discovered in the interior of an intra-uterine polypus. Such a tumour as that shown by Mr. Bland-Sutton was very rare.

The PRESIDENT (Dr. Herbert Spencer) remarked on the difficulty of diagnosis, even with the microscope, in some cases of sarcoma of the uterus. The specimen shown appeared to the naked eye to be fibroid, but he hoped the specimen and the sections would be submitted to the Pathology Committee and that the subsequent history would be given. He had recently examined a dozen cases of sarcoma of the uterus, some of which had been mistaken for fibroid during life, and the diagnosis from inflamed and degenerated fibroids was sometimes attended with difficulty even under the microscope. He had formerly believed that sarcoma of the uterus was an extremely rare disease, but subsequent investigation of the after-histories of "fibroids" and microscopic examination of the cases which recurred showed that it was more common than he at one time thought.

Carcinoma of both Ovaries and of the Sigmoid Flexure.

By J. D. MALCOLM, F.R.C.S.Ed.

THE patient from whom these specimens were removed consulted Dr. Wardlaw Milne, of New Barnet, who promptly recognized that operative treatment was necessary and asked me to see her. She was aged 34 and the mother of two children, the youngest aged 7. Her last pregnancy was five years before the operation, when she miscarried at the sixth month. With the exception of attacks of influenza and occasional "colds" her health had always been good, and there was no family history of cancer. Symptoms of the disease now under consideration were of only four months duration, and began with pain in the right side, whilst a lump was felt in the left side of the abdomen, and the latter gradually enlarged. There was also much indigestion and sometimes the food was vomited. The bowels were not constipated, but rather tended to be loose, and there was never any difficulty in evacuating them.

I found the abdomen distended almost as high as the costal margins by fluid which was apparently free in the peritoneal cavity, and, floating in this like a fœtus in the liquor amnii, there was a very mobile tumour of considerable size but difficult to define. A smaller growth was situated behind the uterus and pushed that organ forward, but this pelvic tumour and the uterus were both to some extent mobile. A diagnosis of two ovarian tumours with free fluid was made, it being considered almost certain that the disease was malignant.

The ovarian tumours and the free fluid were removed on December 17, 1907, without difficulty, both pedicles being long. It was noticed that the sigmoid flexure was also the seat of extensive new growth, and as it seemed possible to get away the whole of the disease this part of the bowel was also excised. Its mesentery was divided close to the posterior wall of the abdomen. In doing this two very large arteries were observed and secured, one coming up out of the pelvis, presumably from the internal iliac, and one coming downwards, from the inferior mesenteric. An enlarged gland lying close to the base of the mesentery was included in the parts removed. When the mesentery was quite free the bowel was divided well above and well below the obvious disease, which was thus removed and an end-to-end anastomosis was made. There was just enough tissue to make the bowel continuous over the pelvic brim without dragging. Some irregularities on the fundus of the uterus looked like new growth, and a panhysterectomy was therefore performed. There was then no evidence of disease that could be detected by touch or by the naked eye.

The patient bore all this treatment very well, and there were no complications of any kind during convalescence. Some fæces were expelled from the rectum soon after the operation, and the bowels never gave any trouble. The temperature rose to 100° F. on the second night, but it should be noted that this degree of temperature was also recorded on the two evenings before the operation. Afterwards the temperature was never above 99° F. The highest pulse-rate, except immediately after the operation, was 108 to the minute. The patient was free from symptoms for a time, but the latest accounts indicate that a secondary development has probably taken place, and, considering the nature of the tumours and the fact that the deepest glands found were cancerous, it was hardly to be hoped that a permanent cure would be effected. The left ovarian tumour and the sigmoid flexure, as shown in figs. 1 and 2, are preserved in the Museum of the Royal College of Surgeons. The right ovary, which measured 9 in. by 5 in., was of similar appearance to the left, but was in many parts necrotic and showed cysts, the largest of which was about 2 in. in diameter.

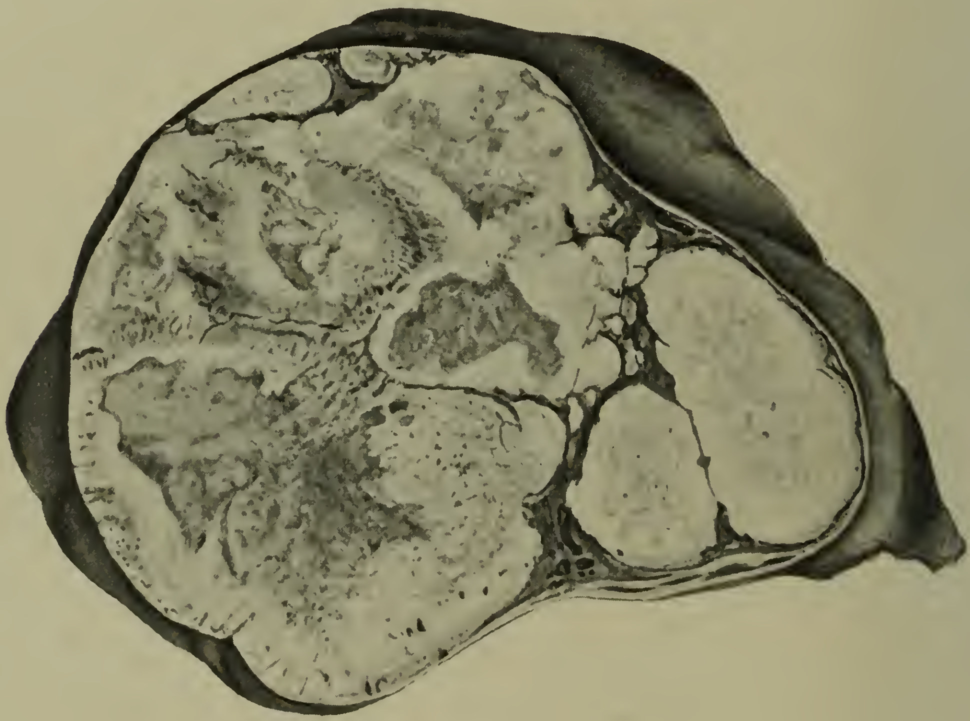

FIG. 1.

Tumour of the left ovary. (Natural size.)

The sigmoid flexure for about 4 in. of its length is infiltrated by a diffuse growth, which in the living body seemed to affect chiefly the parts next the meso-sigmoid, into which it extended deeply (fig. 2). The section of the preserved specimen shows that the growth is widely diffused all round the bowel, the mucous membrane of which is thickened in parts to the extent of $\frac{1}{4}$ in., and the muscular coat is also thickened. An ill-defined extension into the mesentery and an enlarged gland which has been isolated by dissection are also well shown.

Microscopic sections from the sigmoid flexure exhibit a growth consisting partly of narrow lines of spheroidal cells, partly of collections of columnar cells in the form of tubules provided with well-defined lumina. The new growth in the lymphatic glands consists chiefly of spheroidal cells, but here and there a tubular formation is shown in which the cells are of definite columnar type. This is clearly illustrated in fig. 3, for which I am indebted to Mr. Shattock. The histological structure is the same in both ovaries, and in them also it is chiefly spheroidal-celled, but, as in the lymphatic gland, there are growths of

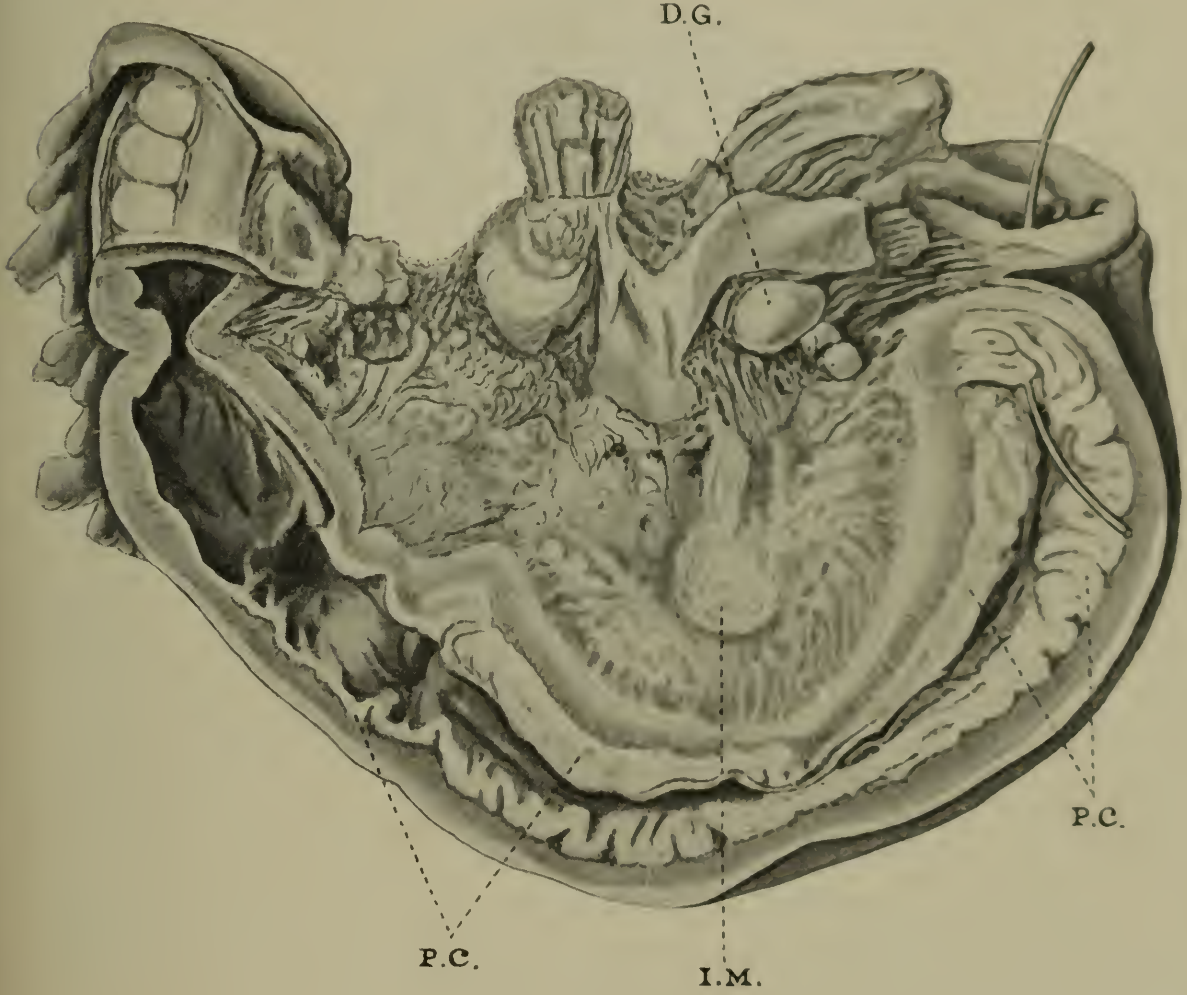

FIG. 2.

Carcinoma of the sigmoid flexure. (Removed by Operation.)

P.C. Primary carcinoma. I.M. Infiltrated mesentery.
D.G. Diseased glands.

columnar cells arranged in tubules. The nodule in the uterus which led to its removal was a small fibro-myoma and not malignant (fig. 3).

In this case it is certain that the disease in the meso-sigmoid and in the lymphatic glands was secondary to that in the bowel, and the conditions support the view that the new growth in the ovaries was also secondary.

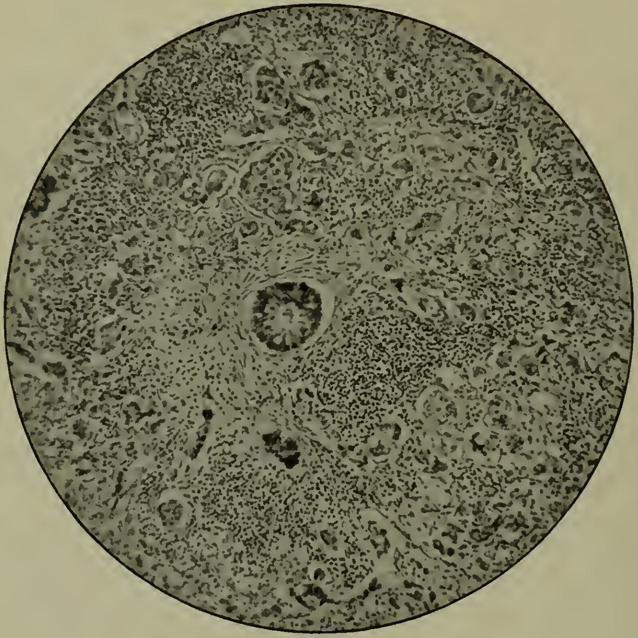

Fig. 3.

Section of gland from meso-colon, showing columnar-celled tubule.

Report of the Pathology Committee.—We agree with the exhibitor's description of the specimen—that it is a columnar-celled tubular carcinoma of the sigmoid with secondary deposits in both ovaries.

Obstetrical and Gynæcological Section.

June 11, 1908.

Dr. HERBERT SPENCER, President of the Section, in the Chair.

Large Hydrosalpinx and small Ovarian Cyst simulating Malignant Disease in a Woman aged 58.

By J. D. MALCOLM, F.R.C.S.Ed.

MR. MALCOLM showed a convoluted hydrosalpinx, measuring about 6½ in. by about 3 in., attached to a small, rounded, ovarian tumour about 2½ in. in diameter. These were removed from a woman, aged 58, whose periods ceased ten years ago. She was the mother of one child, born thirty-two years ago. Menstruation was generally painful, but there was no trouble at the menopause, except that a red discharge continued off and on for three months before the periods finally stopped. Mr. Malcolm removed this patient's gall-bladder on May 20, 1902. The diagnosis between gall-stones and carcinoma was then in doubt, and the following note was made on the pelvic condition: "The uterus is fixed behind and the right ovarian region is tender, but there is nothing that suggests the existence of pelvic malignant disease." The gall-bladder contained calculi and was much disorganized by inflammatory changes, but there was no new growth in it. After the cholecystectomy the patient was in good health until November, 1907, when she complained of pain in the lower abdomen. This ceased for a time, but returned after Christmas, and then became steadily worse.

In April, 1908, a tumour was discovered filling the pelvis, of irregular, largely lobulated outline, and fixed by its size and apparently also by adhesions to surrounding parts. The position of the uterus and of its os was not made out. The mass pressed firmly upon the bladder and upon the rectum, but there seemed to be a considerable thickness between it and the bowel. There was no marked loss of flesh and the patient seemed healthy in other respects.

All who examined her at the Samaritan Free Hospital thought that she probably had a malignant tumour, but there was a difference of opinion as to the propriety of operating on the chance that the growth might be of a less serious nature. Fortunately it was decided to open the abdomen. Even with the parts exposed the diagnosis was not certain, and, indeed, it was not made until the mass was removed. The tube and ovary were everywhere firmly adherent, and were taken out without any pedicle being observed. On the right side the severed Fallopian tube was then discovered; only one small blood-vessel in the broad ligament, and that close to the tube, required to be ligatured. The uterus was very small and completely covered by adhesions. No trace of the left ovary or tube was discovered. Convalescence was rapid and uncomplicated.

The development of a hydrosalpinx so long after the menopause was remarked upon as unusual, and it was suggested that pressure of the ovarian tumour upon the proximal part of the Fallopian tube might be the cause of the distension of that tube.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) did not observe in the specimen any pressure by the ovarian cyst on the proximal end of the tube, nor did he see how such pressure could produce a hydrosalpinx, which, he thought, was always due to obstruction at the distal end of the tube.

Dr. MACNAUGHTON JONES asked how Mr. Malcolm knew that this was hydrosalpinx. Was the tube translucent at the time of removal? There had been no examination of the tube, and it had not been opened.

Mr. MALCOLM, in reply to the President, said that although the specimen did not show clearly that the tumour pressed upon the tube it might have so pushed it upwards that an obstruction by acute bending was brought about. The divided tube appeared to be of very small calibre, but patent. The suggested cause of the hydrosalpinx was, however, merely put forward as a hypothesis. In reply to Dr. Macnaughton Jones, it was said that the tube was quite clear and translucent when fresh.

A Case of Primary Bilateral Papillary Carcinoma of the Ovary.

By T. W. Eden, M.D.

The patient was a multipara (M. C.), aged 68, who was sent to me at the Chelsea Hospital for Women by Dr. Walker Overend, of Clacton-on-Sea. She complained of abdominal pain and enlargement, and Dr. Overend had detected the presence of a tumour in the lower abdomen a few days previously. She had passed the menopause for many years, and she had had slight hæmorrhage for several weeks previously. She was a somewhat feeble woman of spare habit, but active and hard working until recently. On examination could be detected a tender, elastic swelling, lying below the level of the umbilicus and extending far to the left of the middle line. There was no general enlargement of the abdomen, and no sign indicative of free fluid could be detected. On vaginal examination the uterus was found to be small and anteverted, while in the pouch of Douglas could be felt the lower portion of the abdominal swelling. It was judged to be about the size of a cocoanut, and was diagnosed as a cyst of the left ovary.

On February 4, 1908, the abdomen was opened, and the tumour delivered after separating adhesions to the abdominal parietes and to the back of the left broad ligament. There was a small quantity of ascitic fluid in the pelvis. The broad ligament was clamped and the tumour cut away. The tumour was then seen to be a cyst of the right ovary, which had become displaced to the opposite side of the middle line, and had formed adhesions in this situation. Its surface was studded with a number of circular or oval flat elevated areas of papillary growth, and it was, of course, removed entire. On exploring the condition of the left appendages, upon which the tumour had been resting, they were found enlarged and adherent. They were therefore isolated carefully and brought up to the abdominal opening, when it was seen that the ovary and the fimbriated end of the tube were covered with papillary growth resembling that seen upon the surface of the cyst from the other side. The appearance of the growth being suspicious, it was decided to remove the uterus along with these appendages, and this was accordingly done by the supravaginal method. It was then seen that there was a portion of papillary growth lying in the bifurcation of the left iliac artery and implicating the peritoneal coat of a portion of the pelvic colon. This could not have been removed completely without resecting the colon, and, as it was not certain that the growth was anything more than papilliferous cyst, it was decided to leave this portion of the growth undisturbed.

On examination of the cyst of the right ovary it was found to be a multilocular growth, with rather thin brownish contents. The papillomatous areas extended right through the cyst wall and proliferated both upon the internal and external surfaces. The left ovary was cystic, of about the size of a hen's egg, and the greater part of its margin was covered with a delicate papillary growth, which at the outer pole of the ovary extended to the ovarian fimbriæ, and so to the abdominal ostium of the tube. About 1 in. of the tube was found involved in the growth, which had infiltrated the wall from mucosa to peritoneum. The microscopic characters of the growth in all three situations were practically identical. The general appearance was that of freely proliferating compound papilla, consisting of a well-developed and highly vascular connective tissue core and an epithelial covering. The epithelium was in several layers and was undergoing abundant but irregular proliferation, in places filling up the spaces between neighbouring papillæ. The epithelium was also invading the connective tissue stroma of the papillæ in many places. A few areas were seen in which the papillæ were absent, and the growth assumed the character of an adeno-carcinoma.

These appearances clearly indicate the malignant nature of the growth. I regard it as primary in the ovary, both on account of its general features, which are quite unlike those of secondary cancer, and because no trace could be found at the operation, although a careful search was made, of a primary growth in any other part of the abdomen. She made a good recovery from the operation, and four months later Dr. Overend reported that she was in perfectly good health. The portion of growth which was not removed at the operation is, of course, a source of disquietude, but it is possible that this extension may spontaneously disappear, as sometimes happens in the case of other malignant tumours where the primary growth has been removed.

Dr. LOCKYER was glad to find Dr. Eden approved very radical measures in dealing with bilateral carcinoma of the ovaries. Since the publication of a case which first taught this valuable lesson,[1] Dr. Lockyer had had experience of a similar instance, where, after the removal of one very large and one smaller cancerous ovary, the broad ligaments and the uterus itself were all so infiltrated with cancer as to render their removal impossible. The patient died only a week ago, so that there had not yet been time to dissect and investigate the parts removed at the autopsy, but it seemed clear at the operation that the invasion spread from the larger ovarian cancer via mesosalpinx and tube to the uterus.

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[1] *Trans. Obstet. Soc. Lond.*, xlvi., pp. 302-305.

A Case of Sarcoma of the Uterus.

Shown by CUTHBERT LOCKYER, M.D.

THE patient was a married woman, aged 43. She had had two children, aged 13 and 10½ years respectively; both labours were normal. There had been a miscarriage two years ago, and about one year after this a polypus appeared. The woman was admitted into Charing Cross Hospital on January 27, 1908, under the care of Dr. Amand Routh, to whom I am indebted for permission to show the case. She gave the history of having had four operations for growths in the womb, the first of these being in April, 1901, the second in June, 1902, the third in January, 1907, and the last as recently as October 14, 1907. After this last operation the patient remained in bed for six weeks, and subsequently kept quite well until January 25 of this year. Since October, 1907, the periods had been regular and normal. On January 25, 1908, the patient suffered severe pain, which resembled labour pains in every way. The pain came on in attacks every half hour, and started a few hours after the commencement of an expected menstrual period. The pains lasted all night, coming on at half-hourly intervals, and were followed next day by severe hæmorrhage and sickness.

Dr. Routh, of Bridgwater, saw her, and on examination found a polypus protruding into the vagina. On arrival in hospital the patient had a foul-smelling discharge and was passing dark blood-clots. On abdominal examination the uterus was felt 1½ in. above the symphysis. There was a large sloughing mass protruding from the cervix and hanging in the vagina; this Dr. Routh removed with scissors, and took out a large gauze-pack at the same time. The finger was inserted into the cavum uteri after further dilatation, and now that the gauze and polypus were removed the uterus contracted down well and could no longer be felt as an abdominal organ. The patient left hospital thirteen days later.

At Dr. Routh's request I examined the polypoid growth microscopically and reported as follows: "The growth removed from the front wall of the cervix at the level of the internal os is of a dark blue colour and foul smelling, these changes being due to stasis and decomposition. Section of the central part shows it to be a fibroid, the vessels of which are all in a state of thrombosis and the tissues of which are inflamed and œdematous."

Symptoms again returned, another exploration was made, and again I examined the growth, and this time found it to be a typical sarcoma, containing giant-cells; accordingly on May 1, 1908, Dr. Amand Routh performed abdominal panhysterectomy. The peritoneal cavity was not completely closed, as is commonly done, but Dr. Routh left a small central hole through which some iodoform gauze, which had been previously placed in the vagina, was brought. The gauze was arranged to lie flush with the neck of the aperture, but did not project into the peritoneal space. The stitch of silk which united the edges of the vagino-peritoneal aperture was subsequently withdrawn *per vaginam*. The patient made a good recovery.

The specimen (fig. 1) consists of the entire uterus and appendages. On slitting open the front wall the cavity was seen to be nearly filled by a growth arising from the fundus, posterior and right lateral walls of the uterus. All excepting the upper (fundal) portion of the growth was deeply blood-stained and necrotic. This altered portion corresponded to the lower two-thirds of the tumour and hung down in tongues to the cervical level. The upper broad basal part was typically lobulated and smooth, having a pale yellow pink colour.

Externally there was a sessile growth on the peritoneal surface of the fundus, the size of a chestnut, deeply purple in colour, which on section showed a very cellular structure, besides containing much free hæmorrhage. The musculature of the uterus, to which it was attached, was normal in appearance. Microscopically (fig. 2) this submucous tumour is a mixed-celled sarcoma, the predominant feature of which is the presence of an abundance of large giant-cells with single, double, and multiple nuclei. The latter cells are not to be found in the sloughing thrombosed polypus removed on January 27, and this is due, I believe, to the very unsatisfactory state of the tissues for microscopical examination. The subperitoneal growth is a mixed-celled sarcoma, the cells of which are round, oval, and spindle-shaped; there are no giant-cells present. It is a distinct metastasis, the hypertrophied wall of the uterus which intervenes between it and the primary growth showing no invasion whatever.

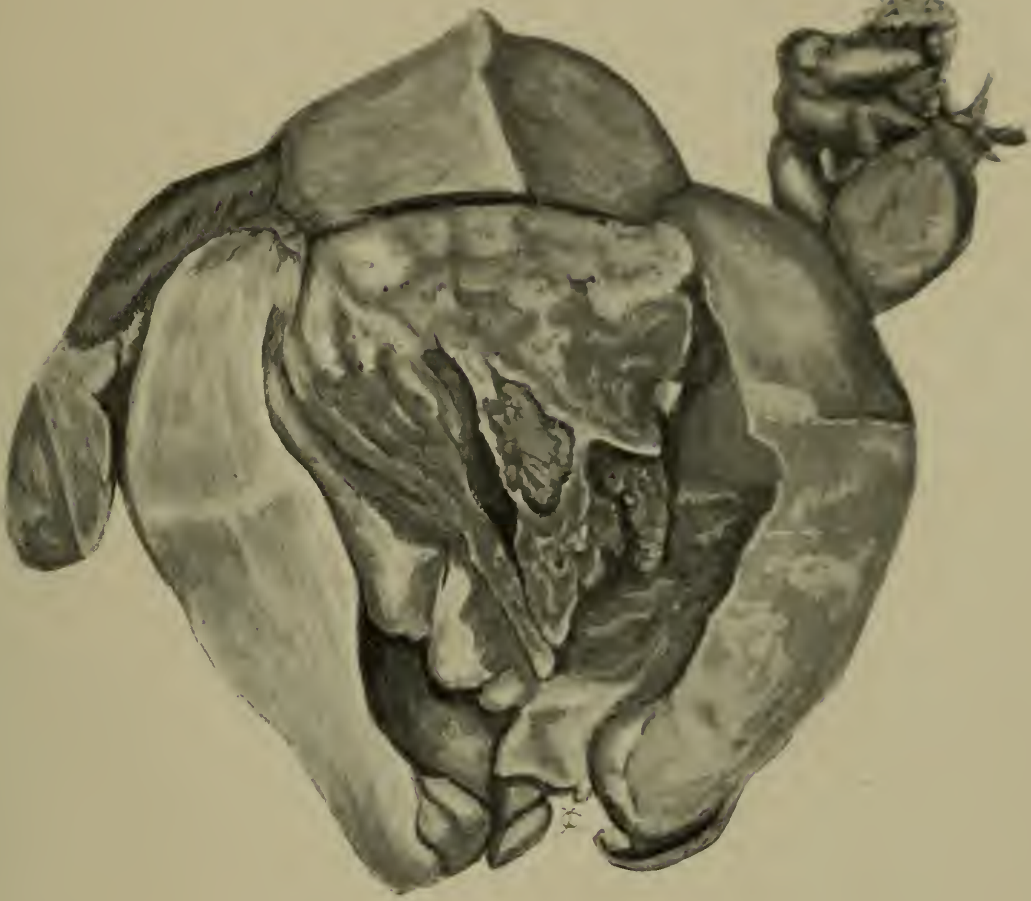


FIG. 1.

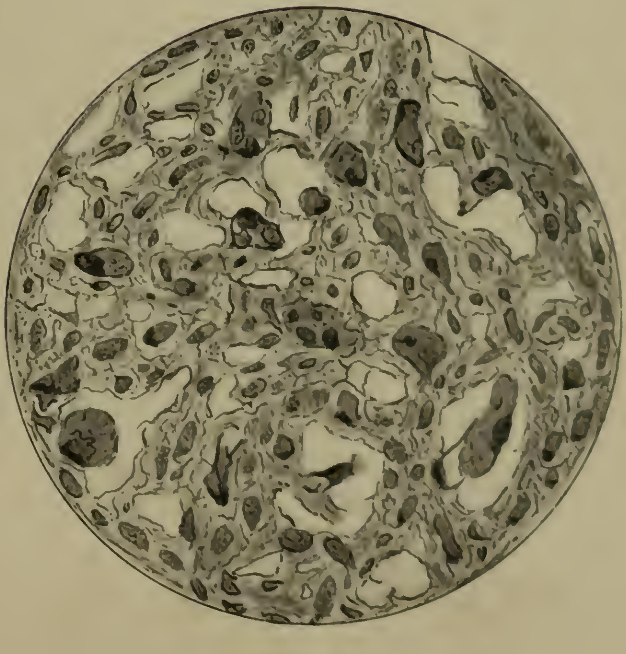


FIG. 2.

The patient is at present in good health, but the prognosis is rendered very unfavourable owing to the presence of the subperitoneal metastasis.

I am indebted to Dr. R. H. F. Routh, of Bridgwater, for the information respecting the four former operations for what were regarded as ordinary fibroid polypi. No sections were made of any of these growths. The fifth polypoid mass I examined myself, but its necrotic condition led to my failure to discover the true nature of the tumour, and it was only when healthier tissue was examined at the sixth exploration in April last that the correct diagnosis was made.

Report of the Pathology Committee.—"We have examined this specimen and the microscopic sections of the uterine growth and agree that the tumour is a mixed-celled sarcoma containing numerous giant-cells."

Dr. AMAND ROUTH mentioned that after he had removed the polypus in January, which Dr. Lockyer had reported to be a fibro-myoma, the uterus appeared to be quite small and to be free from other fibroid nodules. The uterus was therefore not removed. Two months later, when another polypus, stated by Dr. Lockyer to be sarcomatous, was removed, the uterus was so enlarged that, owing to the relatively small vagina, it had to be removed by abdominal section.

Pregnancy in the Wall of a Tubal Pus Sac.

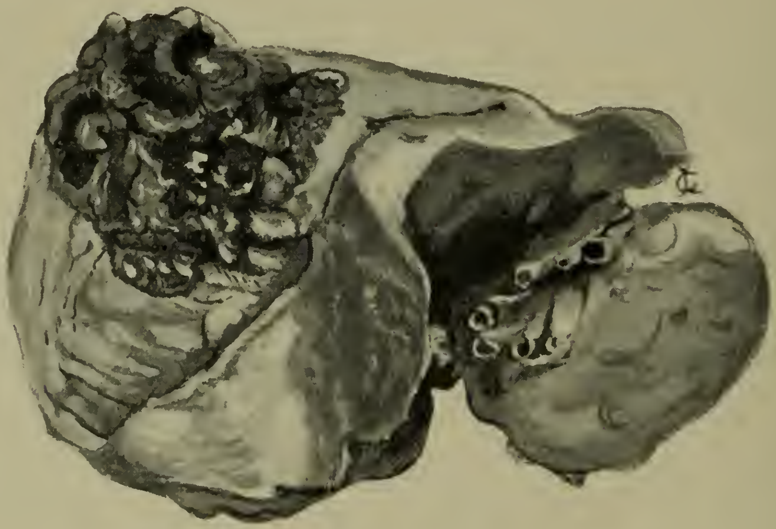
Shown by CUTHBERT LOCKYER, M.D.

I AM indebted to my chief, Dr. Amand Routh, for his kind permission to bring this case before the notice of this Section. The patient was a married woman, aged 29. She had had two children; the youngest was aged 8¾ years. The confinements were spontaneous.

For the last four years the menstrual periods had been very painful, offensive and altered in colour. Each month during this time the patient had to lie up on account of the pain, which she described as "bearing down" in character. The flow lasted eight days, was never of the colour of healthy blood, but began as a pinkish fluid and ended as a dirty brown discharge. In amount this discharge was abundant and was always preceded by copious leucorrhœa, from which the patient suffered continuously between the menses, but not to the same extent as just before the menstrual flow. There was no history of gonorrhœa or dispareunia obtainable. In November, 1907, the period should have appeared on the third of the month; it did not do so, but on November 14 the patient was seized with great abdominal pain and a slight pink discharge escaped from the uterus. There was no sickness, but the patient fainted two or three times during the next few days.

On November 23 severe uterine hæmorrhage started whilst the patient was at work; she laid up for three days, did not faint, and said she felt relieved by the loss. For the next two months the patient saw Dr. Eden several times in the out department at Charing Cross Hospital. The first visit was on November 20, three days before the loss above mentioned. The uterus was then enlarged, there was nothing characteristic of pregnancy in the cervix, and nothing wrong with the appendages was noted. On December 4 the uterus was still bulky, the os was open and the patient was losing freely. The loss continued for a month as an offensive blood-stained discharge. On January 11, 1908, the uterus was found tilted to the left, and behind it a soft, ill-defined swelling was felt; this developed by January 22 into a tense, cystic, tender swelling the size of an orange. On January 25 the patient was admitted under Dr. Amand Routh, who felt a mass in the right posterior quarter of the pelvis united to the uterus by a band. This mass was evidently smaller than it was when first noted by Dr. Eden. The uterus was explored for retained products, but none were found; the patient left hospital on February 6, the pelvic swelling having meanwhile steadily diminished in size. She remained quite well until February 24, when she was seized with violent pain in the right pelvis, and on February 26 there was a severe loss whilst she was in bed and she was at once readmitted. There had been a "normal period" between the time of discharge from hospital and readmission (February 6 and 26). Dr. Routh performed laparotomy on March 2. The right tube and ovary were removed and form the specimen shown to-night. There was no sign of internal hæmorrhage. The wound healed *per primam*.

The specimen consists of the tube and ovary of the right side (*see* fig.). The entire tube is thickened; in its outer two-thirds it forms a thick-walled sac, from which, when Dr. Routh incised it, a quantity of fluid pus escaped. This was reported on by Mr. Leatham as being quite sterile. The sac forms a rounded body and is twisted upon the uterine portion of the tube, so as to form, with the latter, a retort-shaped tubal pyosalpinx. In the anterior wall of the sac lies a circular blood-clot, having a diameter equal to that of a penny piece. It is quite localized and sharply defined at its edges, although the latter are irregular. Microscopic examination of this blood-clot reveals the presence of chorionic villi ; these lie free in the clot and can also be traced into the adjacent degenerate and inflamed muscle tissue. As already stated, the sac contained purulent fluid but no free blood, nor was there any blood in the abdominal cavity. The small hæmatoma is therefore an intramural tubal mole, which, although it is seen to form a convex swelling on the peritoneal surface of the tube (paratubal hæmatocele of Handley), had never ruptured and caused free peritoneal hæmorrhage; neither was there any sign of free blood in the lumen of the tube. This strange situation for a tubal mole is interesting if not unique, and gives rise to many important speculations, to answer some of which our accredited knowledge of tubal gestation may be found inadequate.



Specimen of the right tube and ovary.

The past history of the patient points to tubal inflammation extending over a period of four years ; her recent illness led Dr. Amand Routh to suspect tubal pregnancy, and the patient was discharged from hospital under the impression that a tubal mole had formed and was being absorbed, the reduction in size of the swelling justifying this conclusion.

At the operation, as the swelling contained pus, and as there was no bleeding into the peritoneal space, the diagnosis of ectopic pregnancy seemed erroneous, and it remained for the microscope to prove its presence. A case somewhat akin to the present one, excepting that there was no pus sac present, was shown by Dr. Eden at the Obstetrical Society in 1906,[1] entitled: "A Case of Tubal Pregnancy with Acute Salpingitis." No pus was found by Dr. Eden in his case, and, after describing the wall of the tube as of $\frac{3}{4}$ in. in thickness, the author remarks that "it is rare to find a gravid Fallopian tube with such extensive inflammatory changes as have been here described."

This remark is equally applicable in the present instance, where to chronic thickening of the uterine end of the tube (the cut wall being $\frac{1}{2}$ in. in thickness) is added the distal pus sac. The questions which are hard to answer are: How long does it take for a thick-walled purulent sacto-salpinx to form? and, when formed, how can an ovum gain access to its lumen, become fertilized, and embed itself in the walls? Yet this might be said to represent the sequence of events as presented by the patient's history. The alternative view would be that the small intramural mole was the first tubal lesion and that the chronic thickening and ultimate tubal pus sac were of later formation. This interpretation removes all difficulties of a mechanical nature, only to introduce others of a pathological kind, for the patient, who was taken ill on November 11, 1906, was found to have a pelvic tumour on January 11, 1907, and the operation on March 2 proved that the swelling was a pus sac with thick, chronically indurated walls. It is impossible to assume that such gross inflammatory changes are secondary to a molar pregnancy of two or three months' duration. The most tangible explanation seems to be that pregnancy has occurred in a tube which had previously been damaged by chronic interstitial salpingitis, and that, following the embedding of the ovum and the formation of a mole in its walls, the lumen of the chronically indurated tube became converted into a pus cavity.

DISCUSSION.

Dr. EDEN said that he thought a different explanation of the appearances in this specimen could be offered. He regarded it as extremely improbable that gestation could occur in a suppurating tube, or, indeed, in any tube which had undergone well-marked inflammatory changes. Such tubes were invariably sealed at the abdominal ostia, and the entrance of an ovum was accordingly impossible. He suggested that the inflammatory changes had followed, not preceded, the occurrence of gestation in the tube, and that the pyosalpinx was the result of suppuration occurring in a tubal mole. The clinical history of the case appeared to support this view, and there was certainly no definite evidence of the existence of salpingitis before conception. The time which had elapsed between conception and operation was quite sufficient for the occurrence of the gross changes in the tube wall which Dr. Lockyer had described. He had himself shown to the Obstetrical Society in October, 1906, a specimen of tubal pregnancy with acute salpingitis, and although no suppuration had occurred there was well-marked thickening of the tube wall, which averaged $\frac{3}{4}$ in. in thickness. The patient had been in perfect health and was, indeed, suckling her last child at the time of occurrence of the tubal gestation. The pre-existence of tubal inflammation was therefore hardly possible in this case, and he should prefer to regard Dr. Lockyer's case as one of similar character.

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[1] *Obstet. Soc. Trans.*, xlviii., pp. 272-277.

Dr. TATE referred to a case of tubal gestation on which he had operated in January, 1908, in which there was rupture of the right pregnant tube with intraperitoneal hæmorrhage, and a pyosalpinx and suppurating cyst of the ovary on the opposite side. The wall of the tube on the pregnant side was thicker and firmer than is usually the case, and it seemed probable that there had been some old inflammation on this side. Moreover, it is very rare to find gross suppurative disease on one side without a certain amount of inflammation on the opposite side. Although salpingitis is only rarely an antecedent of tubal gestation, the present case seemed to confirm Dr. Lockyer's view that gestation may occur occasionally in a tube markedly diseased.

Dr. AMAND ROUTH thought the clinical facts of the case seemed to show that the tube became infected after the patient left the hospital the first time, when she was believed to have recovered from the risks attending the formation of a tubal mole. When she returned to the hospital the tubal swelling was much larger and more fixed, and there were both pyrexia and pelvic pain and tenderness. The other Fallopian tube was removed at the second operation because it was enlarged and its ostium sealed.

Dr. MCCANN said that about twelve months ago he had operated on a patient who had a pyosalpinx on one side and a tubal pregnancy on the other. There was a history of repeated attacks of pelvic inflammation, indicating that the salpingitis had antedated the occurrence of the tubal pregnancy. Dr. McCann still thought that previous salpingitis did play a part in the causation of tubal pregnancy, although he was aware that many observers held a contrary opinion. In his experience salpingitis had been found so frequently in conjunction with tubal pregnancy that their association must be more than a coincidence.

Dr. LOCKYER, in reply to Dr. Eden, said that with regard to the sequence of pathological events he found it difficult to believe that such fibroid thickening as was seen to exist in the tube wall could have been formed subsequent to the embedding of the ovum, which the history showed took place in the middle of November, 1907. In reply to Dr. Tate and Mr. Targett, Dr. Lockyer stated that the opposite tube was removed by Dr. Routh, whilst the opposite ovary was left in situ. Unfortunately this tube was not examined microscopically, so that there was only the clinical evidence to support the contention that it was diseased. Dr. Lockyer had no hesitation in accepting the belief that it was possible for a fertilized ovum to embed itself in the walls of a Fallopian tube damaged by an inflammatory disease.

Grape-like Sarcoma of the Cervix Uteri.

By Frederick J. McCann, M.D.

Grape-like sarcoma of the cervix uteri is a rare disease, and comparatively few cases have been recorded. In my book on "Cancer of the Womb," p. 111, I have given a short description of the disease, taken from the records at present available, but I had not met with an example in the living subject until I was asked to see the case here described.

The patient presented herself at the out-patient department of the Samaritan Hospital, and was seen by my colleague, Dr. Abernethy Willett, who kindly sent her into my ward. She was a bronzed, fairly well-nourished woman, aged 52, who assisted her husband to work a barge. When admitted into hospital on May 15, 1907, she complained of a profuse, fœtid, brownish yellow discharge, which had persisted for six months, but no blood had been observed in it. She had had six children, the last born ten years previously. Her confinements had been without difficulty, and she never had a miscarriage. Menstruation had been regular, each period lasting two to three days without excessive blood loss. She stated that she had been getting thinner for a month, but had not suffered pain.

Examination of the abdomen revealed nothing abnormal, but on inspecting the vulva, after separating the labia, a reddish purple polypoid growth was seen occupying the vulvar inlet. When the finger was inserted into the vagina the upper part of the canal was found to be occupied by a large, smooth, irregular growth, which apparently sprang from the interior of the cervix. Owing to the larger amount of the neoplasm being close to the cervix it was difficult to define its exact origin.

It was not until the patient was anæsthetized and prepared for operation on May 22, 1907, that a thorough examination could be made. The tumour was then found to spring from the interior of the cervical canal, the rim of the os externum being unaffected. It caused distension of the vaginal canal by its size, but no involvement of the vaginal walls had occurred. The growth was extremely friable, very vascular, and consisted of some more solid portions, reddish purple in colour, other portions grey in colour and marrow-like in consistence, and the remainder oval, yellow, translucent, grape-like bodies (fig. 1), chiefly situated at the peripheræ of that part of the growth close to the cervix. These grape-like bodies were readily crushed when touched, and contained straw-coloured sticky fluid. The body of the uterus was slightly enlarged, whilst the cervix was markedly expanded and thickened. I decided to perform vaginal hysterectomy, and for this purpose the tumour mass was clamped and cut away before the excision of the uterus. The pouch of Douglas was not opened until the last stage of the operation, in order to prevent soiling the peritoneal cavity, the body of the uterus being turned out through the incised utero-vesical pouch.[1] The right ovary was found to contain a multilocular cyst, possessing thick walls, which was about the size of a tennis-ball. This cyst was removed. The left ovary, which appeared to be healthy, was conserved. Both clamps and ligatures were used during the operation, and owing to the extreme vascularity of the tissues it was deemed advisable to leave some of the clamps in situ. The clamps were removed the following evening at 5 p.m., the operation having been performed at 9.30 a.m. Her convalescence after the operation was uneventful, and she left the hospital on June 15, 1907, much improved in health.

She was instructed to report herself at once if there should be any return of the symptoms. Accordingly on April 16, 1908, she again returned to the hospital. She had been able to do hard work on the barge, but for five months she had experienced a feeling in the vagina "as if something was coming down." A month before her readmission, whilst straining at stool, some blood escaped from the vagina. A fortnight later pain was felt in the lower part of the abdomen, worse at night, and daily small losses of blood occurred after using a syringe. A foul vaginal discharge had continued for a month. She looked ill and had lost flesh. When examined *per hypogastrium* a movable mass was felt occupying the position of the uterus in the centre of the pelvis. Separation of the labia revealed a growth similar to the primary growth protruding through the vulvar orifice. The bluish purple colour was specially noticeable. The growth (fig. 2) filled the whole vagina and appeared to spring from the position of the cicatrix in the vaginal roof and to extend upwards into the pelvic cavity. The vaginal walls still remained intact and there was no subvaginal infiltration. The recurrent growth was removed, the hæmorrhage carefully arrested, and after three weeks residence in the hospital she was again discharged, much improved in appearance. She has not again reported herself.

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[1] "Cancer of the Womb," p. 82.

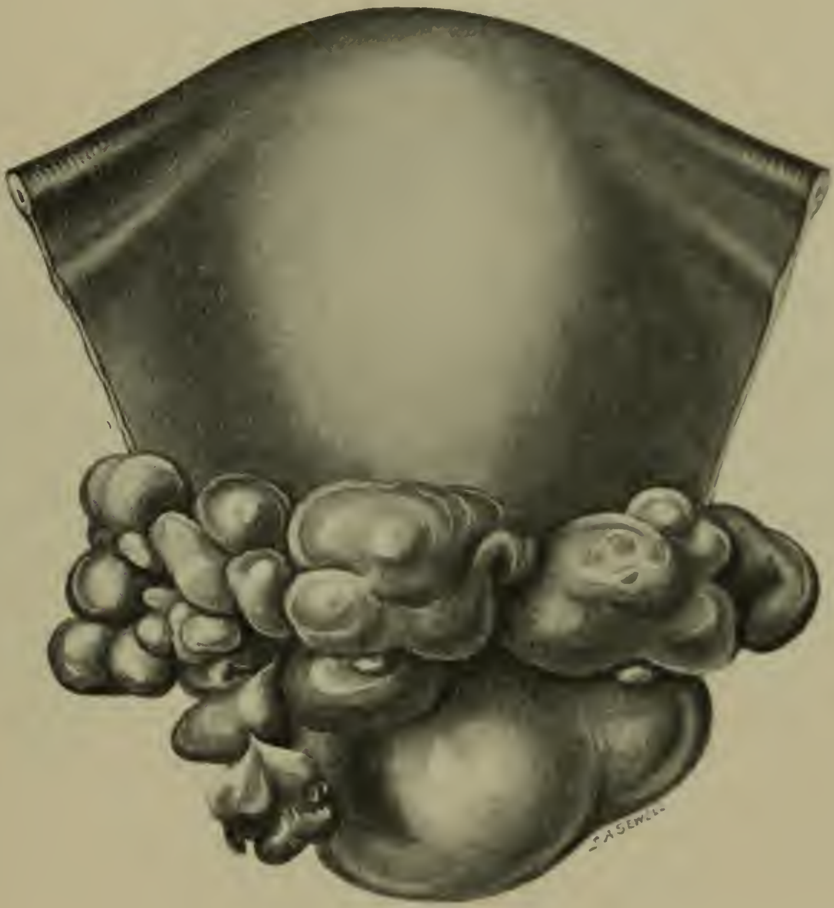

FIG. 1.

Drawing of the primary growth, showing the grape-like bodies growing from the cervix uteri. (Natural size.)

The recurrent growth was much larger than the primary growth and firmer in consistence. There were a large number of grape-like bodies, and these again were found in that portion of the growth close to the vaginal roof. A hard, gritty mass was present in the centre, which appeared to the naked eye to be composed of cartilage

This was proved to be correct by a subsequent microscopical examination (fig. 3).

In addition to the grape-like sarcoma just described I have removed the uterus from three other patients on account of a sarcomatous growth from the cervix. The outstanding feature, however, of this variety of sarcoma is the presence of a number of œdematous blebs, or bullæ, whose appearance has been compared with grapes or with a hydatid mole. Histologically, such tumours have been found to be composed of round- or spindle-cells (fig. 3), with occasional

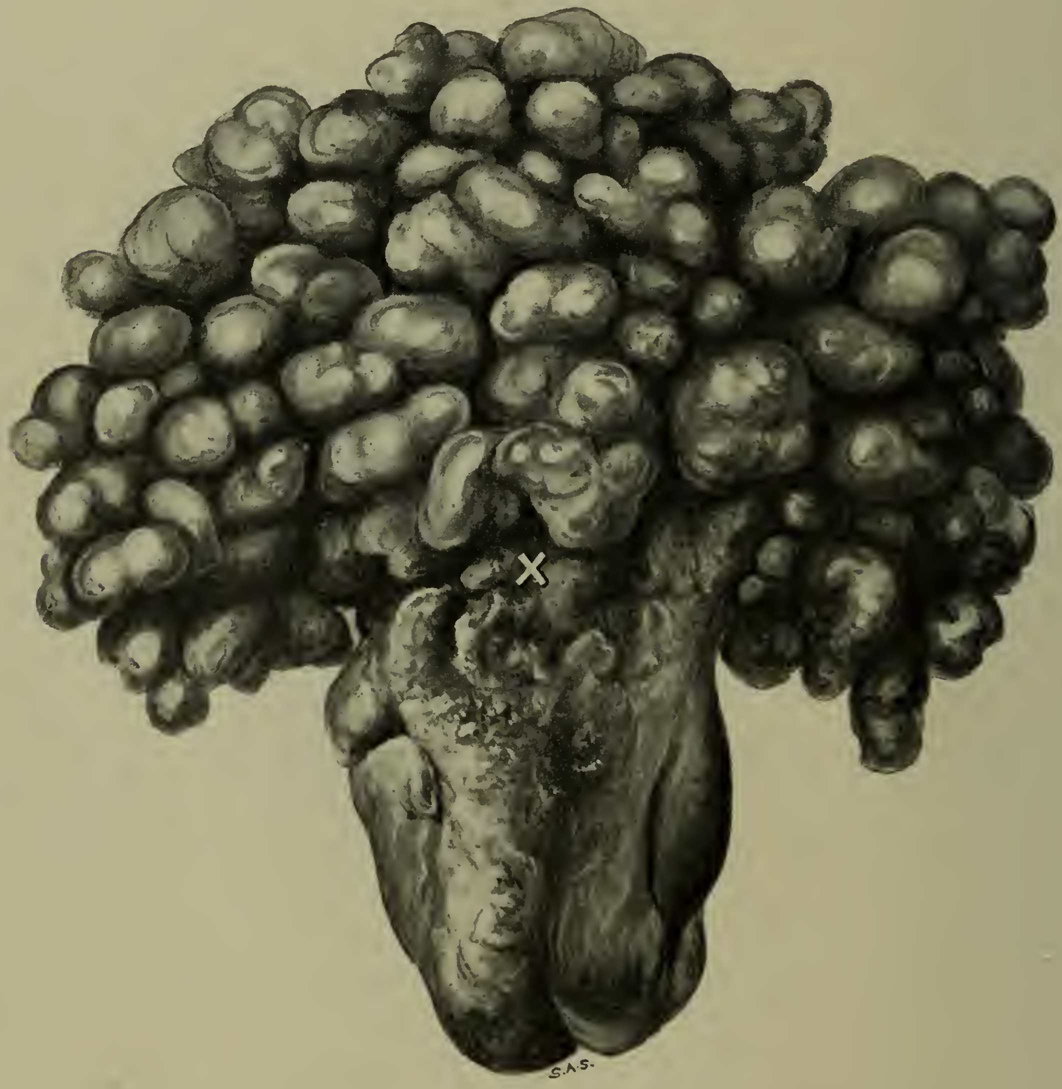

FIG. 2.

The recurrent growth, which was removed at the second operation. The grape-like bodies are situated at the peripheræ of the upper portion of the growth. The white cross (×) indicates the position of the cartilage found in its substance. The lower, more solid portion was bluish purple in colour and protruded through the vulvar orifice. (Natural size.)

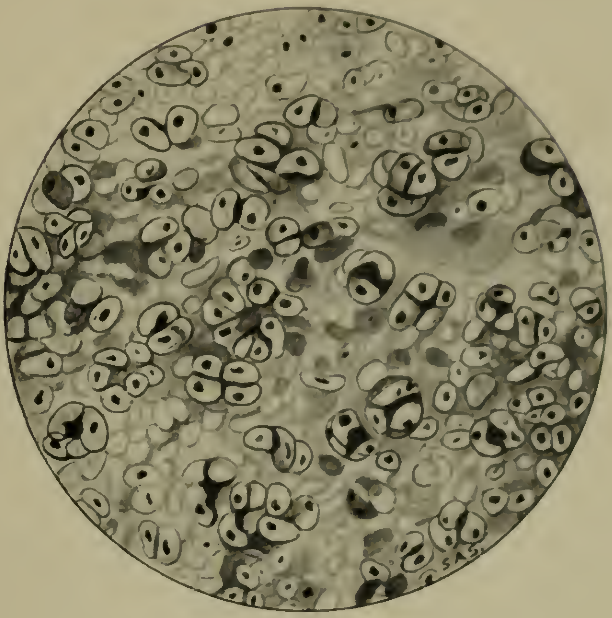

Fig. 3.

Section taken from that portion of the growth containing cartilage. Note the rounded nucleated cells scattered in groups of two and four.

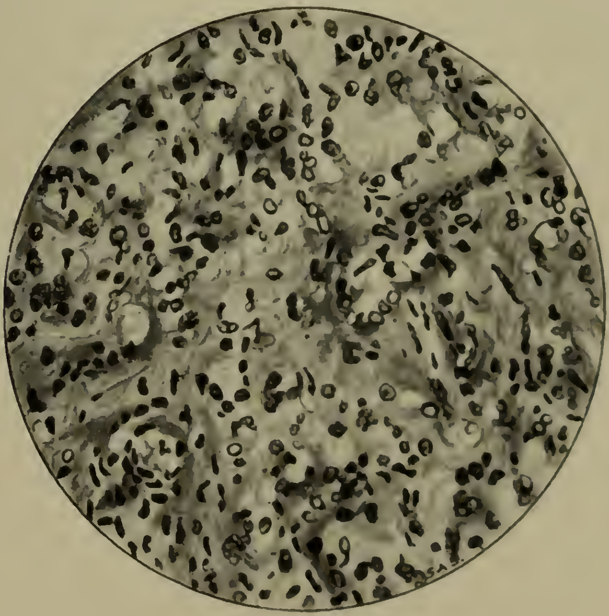

Fig. 4.

Drawing representing a microscopical section taken from the more solid portion of the neoplasm, showing the structure to be composed of round- and oat-shaped cells, separated by intercellular stroma. The cells contain well-marked nuclei. The inter-cellular substance is homogeneous and takes the stain faintly. The majority of the blood-vessels were not well formed.

multinucleated giant-cells. Striped muscle fibre (Pernice) and hyaline cartilage (Rein) have also been observed. Numerous blood-vessels are also present. The nature of the material contained in the intercellular substance and in the grape-like bodies has been alleged to be mucin, but Pfannenstiel and other observers have shown that it does not give the reactions of mucin and that œdema has occurred in the growth, leading to the formation of blebs or bullæ, the so-called grape-like bodies. The neoplasm is therefore considered to be a mixed-cell sarcoma infiltrated with lymph, and not a myxoma or a myxosarcoma. Certainly the appearance presented by the specimens obtained from the growth removed from the patient whose clinical history is here detailed all tend to support this view. It was further noticeable that the grape-like bodies were more numerous at the peripheræ of the tumour close to the vaginal vault and that they were more numerous when the discharge was very foul. This would suggest that septic infection, with consequent local œdema, was the cause of this peculiar appearance. In a recent case of cervical sarcoma which I treated by abdominal panhysterectomy, removing at the same time the upper fourth of the vaginal canal, the macroscopic appearance of the disease was precisely similar to what has been already described, but no grape-like bodies were present. The growth, however, was smaller, only projecting for 1½ in. into the vaginal canal and springing by a pedicle from the anterior lip of the cervix. No foul discharge had ever been present. If these facts should be substantiated by future investigations, then it will be necessary to reconsider the advisability of creating a special class of sarcoma under the appellation "grape-like sarcoma." The neoplasm originates from the lower segment of the cervical mucosa and grows out of the cervix into the vagina. In the later stages the disease spreads to the body of the uterus, to the vaginal walls, to the tissues of the cervix, and to the parametrium. Its cervical origin distinguishes the disease from hydatid mole, whilst the microscopical examination excludes mucous polypi.

The age incidence corresponds to that of sarcomata arising from the uterine mucosa. Of eighteen examples of the disease, culled from the literature, the ages of the patients were as follows:—

45 years
50 ,,
35 ,,
17 ,,
21 years
31 ,,
19½ ,,
24 ,,
17 years
63 ,,
2¼ ,,
47 ,,
19 years
53 ,,
2¾ ,,
52 years[1]
39 ,,
1 year

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[1] The case described.

Thus one half of the cases occurred under 25, four at 50 or over, and five between the ages of 25 and 50.

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McCann. "Cancer of the Womb," p. 111.

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Pfannenstiel. "Das traubige Sarkom der Cervix uteri," *Virchow's Archiv*, 1892, cxxvii., p. 305.

Rein. "Myxoma enchondromatodes arborescens colli uteri," *Archiv. f. Gyn.*, xv., p. 187.

Williamson. *Obstet. Soc. Trans.*, 1905, xlvii., p. 119.

Dr. McCann, in reply to the President, stated that in one of the recorded specimens cartilage had been found.

A Case of Bilateral Tuberculous Salpingitis, with Remarks on the Treatment of Genital Tuberculosis in the Female.

By Frederick J. McCann, M.D.

A spare, delicate-looking woman, aged 30, was sent to me on account of a more or less constant aching in the sacral region. For this complaint she had had much medical treatment and had worn several pessaries without benefit. She had been married for ten years and was sterile. Her monthly periods were regular in duration and quantity. No family history of tuberculous disease could be obtained.

Abdominal examination revealed nothing abnormal, but bimanually the posterior quarters of the pelvis were found to be occupied by a transversely elongated elastic mass exhibiting at one spot definite fluctuation. The uterus, not enlarged, could be distinguished in front of the swelling. A diagnosis of pyosalpinx was made and operation recommended.

On opening the abdomen a small amount of ascitic fluid was discovered, and the intestines occupying the lower portion of the abdominal cavity were studded with numerous grey miliary tubercles, whose presence was also noted on the peritoneal surface of the uterus. It was then seen that the swelling, felt bimanually, consisted of two dilated Fallopian tubes adhering closely together and sealed at their fimbriated extremities. The larger swelling was situated on the right side. After careful separation the left tube and ovary were brought up through the abdominal incision, and, as the ovary was found to be free from disease, the tube only was removed. The larger swelling on the right side was now separated and brought into the wound, and, as the right ovary appeared to be healthy, it was not removed. The vessels in both pedicles were separately ligatured with fine linen thread, no transfixion being employed, and then covered with peritoneum, catgut being used as the suture material. The pelvic cavity was cleansed and the abdominal wall closed. Special care was taken during the operation to prevent infection of the abdominal wound. The patient made an uneventful recovery, the abdominal wall healing soundly.

Description of Specimen.—The right Fallopian tube measured $3\frac{3}{4}$ in. in length and $2\frac{1}{4}$ in. at its widest portion. It was convoluted and dilated, the dilatation being most marked in its outer half; the abdominal ostium was completely sealed; the dilated tube was filled with a thick yellow purulent fluid and the tube wall was thickened; on the peritoneal surface a number of small grey miliary tubercles were present. The left Fallopian tube measured $2\frac{3}{4}$ in. and $1\frac{1}{2}$ in. at its widest portion, which was towards the ampullary extremity. It was not so convoluted as that on the right side; the ostium abdominale was sealed and there was thickening of the tubal wall; the contents of the tube were purulent in character and miliary tubercles were scattered over the peritoneal surface. In the figures, which represent the parts removed, the difference in size of the two tubes and the more marked convolutions in the right tube are striking features.

Many more examples of tuberculous disease of the Fallopian tubes are now recorded because of the increased frequency with which tubal diseases are treated by abdominal operation. The special interest attaching to the case here narrated is the apparent localization of the disease to the lower segment of the abdominal cavity. Miliary tubercles were present only in the peritoneal surface of the lowest coils of small intestine and on the sigmoid colon; the peritoneal surface of the uterus was also studded with tubercles. For this reason it is probable that the disease originated primarily in the Fallopian tubes, causing closure of the abdominal ostia and subsequent pyosalpinx. In addition, the infection had spread to the lower portion of the abdominal cavity. On the other hand, the Fallopian tubes may remain apparently free from infection as far as the unaided eye can tell even when tubercle is disseminated through the abdominal cavity.

I have lately operated on three cases of abdominal tuberculosis in which an inspection of the Fallopian tubes and uterus failed to detect any evidence of tubercle. One of these cases was specially interesting and instructive. A woman, aged 45, was sent to me complaining of pain and swelling in the right iliac region, varying in severity, which had persisted for several years. On bimanual examination a mass was felt separate from the uterus, occupying the level of the pelvic brim on the right side, and which I thought was composed of the vermiform appendix adherent to the right appendages. I therefore opened the abdomen in the right linea semilunaris, and found that the mass was calcareous, with omentum and intestinal coils adhering to it. The vermiform appendix was easily separable, and was not removed. I separated the omentum and intestinal coils and removed the mass, which was irregular in outline and stony hard, being 1½ in. by 1 in. in size. There were numerous adhesions throughout the abdominal cavity, but on inspecting the uterus and appendages no disease was apparent. The abdominal wall was closed in layers. The patient recovered. The pain from which she suffered has been completely removed, and she writes to say she "has never felt so well for years."

Cases such as these serve to emphasize the importance of remembering the possibility of tuberculous disease being the cause of persistent and obscure abdominal pain, especially if associated with occasional elevation of temperature.

A growing tendency towards conservative surgery is now apparent in the treatment of genital tuberculosis. This is destined to increase with advancing knowledge concerning the curability of many varieties of tuberculous disease. Nothing is more remarkable than the rapid cure which certain forms of abdominal tuberculosis undergo after a simple exploratory operation. Further, the success which attends even partial removal of tuberculous disease, leaving Nature to complete the cure, further strengthens the plea for the employment of conservative measures.

It is curious how frequently the ovaries have been reported healthy when examined after the appendages had been removed for tuberculous salpingitis. If there is no evidence of tubercle in the ovaries they should certainly not be removed, and if the infection is only slight there is still no reason why they should be sacrificed, for tuberculous foci can, if necessary, be excised. When the disease is advanced and has already destroyed the function of the ovary, radical treatment is necessitated. The formation of a pyosalpinx is a definite indication for surgical treatment, which is best effected by the abdominal route, as this permits a thorough inspection of the pelvic contents, and has the additional advantage which opening the abdominal cavity undoubtedly possesses in the treatment of abdominal tuberculosis. Incision and drainage of the pus sacs from the vaginal aspect is now recommended and practised, and may yet be shown to be productive of good results. Aspiration of the pus sacs, followed by the employment of an appropriate vaccine, would seem to be the ideal treatment.

When the uterus is only slightly involved, *e.g.*, miliary tubercles being evident on its peritoneal surface, it should not be removed, as it is illogical and unscientific to remove this organ whilst leaving undisturbed a widespread infection of the intestines, omentum and mesentery.

Those who argue in favour of a complete excision of the internal genitals compare tuberculosis with cancer and consider that the same treatment is indicated for both. The two diseases are, however, entirely different, for in tubercle a cure is frequently obtained by medical treatment, by simple exploratory incision opening the abdominal cavity, or by partial excision of the diseased area. In cancer, on the other hand, there is no such process of repair, certainly not when the internal genitals of the human female are involved. For these reasons I think the time has arrived when our position with regard to the treatment of tuberculosis of the internal genitals in the female requires reconsideration, and that more conservative methods should prevail in the future.

Moreover, the surgical treatment is only a part of what is required to effect a cure in the majority of the cases. All such patients for months, or even years, should, as far as is possible, enjoy plenty of fresh air and sunlight, and a suitable dietetic regimen should be prescribed for them.

DISCUSSION.

Mrs. BOYD asked whether there were any adhesions to the ovaries in Dr. McCann's case. She thought it was impossible to generalize about the conservative treatment of tuberculous tubes, for in many cases the ovaries were matted to the tubes, and in one case she had found much infiltration of the ovary, through which small foci of pus were scattered. She thought aspiration would be impossible or unsatisfactory in cases where the tubes were full of caseous material or where the pus was walled off in separate loculi of the tube.

Dr. LOCKYER was in sympathy and accord with Mrs. Stanley Boyd's remarks as to the impossibility of laying down hard and fast rules of operative treatment in cases of tuberculosis of the appendages. Cases must be taken on their merits. Whilst the ideal conservative plan of aspiration and treatment by tuberculin might be adopted in some cases, there were certainly others where huge pus sacs adherent to the uterus, and practically inseparable from it, would necessitate the removal of the entire genitalia. Dr. Lockyer had published such a case,[1] where, in dealing with advanced tuberculous disease of the tubes and ovaries, he found it practically impossible to leave the adherent uterus. In the discussion which followed it was conceded that in this particular case the removal of the uterus was justifiable.

Dr. MACNAUGHTON JONES said that he had so recently occupied the time of the Section with the subject of tuberculous salpingitis that he hesitated to speak on the subject again. He wished just to say that he quite agreed with Dr. McCann's remarks as to the extent of the operation required in many of these cases. It was quite unnecessary to do a sweeping radical operation if the tubercle were confined to the tube, its most frequent site. If the tubercles were disseminated on the peritoneal surface of the tube and spreading on to the ovary, or there was suspicion of the involvement of the latter, then necessarily it had to be removed; the same remark applied to the case of upward spread of the disease from the uterus. The cases he had brought before the Section clearly proved that such radical measures were not indicated when the infection was so localized. In these the women were alive and well years after the salpingo-oöphorectomy at one side had been performed. Also, in one of them several pregnancies had followed. Here, after an interval of over six years, the opposite adnexa had to be removed for septic infection, and, as shown by Dr. Cuthbert Lockyer, there was a complete absence of tubercle.

The PRESIDENT (Dr. Herbert Spencer) approved of Dr. McCann's leaving the ovaries. He hoped that the subsequent history of the patient would be published and would justify the conservative treatment. He thought that the treatment of tubercle of the tubes and of the uterus was, at the present time, unnecessarily radical.

Dr. MCCANN, in reply, stated that in the case under consideration the ovaries were easily separated, and, as they appeared to the naked eye free from disease, he did not remove them. Where, however, they were much diseased, as described by Mrs. Boyd, it was the correct treatment to remove them. He deprecated the removal of the entire internal genital organs unless for advanced disease. Every case must be judged on its merits, but, wherever possible, it was well to lean towards conservative treatment, as the power of repair which exists in cases of abdominal tuberculosis was well known. It was further illogical to remove the uterus when only a few miliary tubercles were on its peritoneal surface, whilst leaving intestine, mesentery and omentum, which were extensively involved. The presence of pus sacs was a definite indication for operation, and, although he had suggested aspiration, he had not yet given it a trial. Aspiration seemed to be the ideal treatment, and if, thanks to the work of Sir A. Wright and others, a suitable vaccine were subsequently used, good results would be obtained. He felt that the time had come for adopting a more conservative attitude in the treatment of tuberculous disease of the female genitalia, as hitherto the tendency had been towards too frequent resort to "radical treatment."

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[1] *Trans. Obstet. Soc. Lond.*, xlix., p. 141.

Demonstration of an extremely young Human Ovum (Teacher-Bryce Ovum).

By JOHN H. TEACHER, M.D.

THE following is an abstract of the descriptive part of a memoir (including also Dr. John M. Munro Kerr's ovum) which will be issued shortly.[1] The specimen was found by Dr. Teacher, and on examination appeared to be so important and promised to throw light on so many difficult embryological questions that the coöperation of Dr. T. H. Bryce was invited, and the memoir, as far as this ovum is concerned, is therefore the joint work of Dr. Teacher and Dr. Bryce.

The ovum was found in a portion of decidual membrane shed by abortion thirty-eight (38) days after the last menstruation, eleven days after the date of the expected menstruation and sixteen days after coitus. Allowing about twenty-four hours for the occurrence of fertilization, and about twenty-four hours for the expulsion of the membrane, the probable age of the ovum is thirteen to fourteen days after fertilization.

The membrane was fixed in absolute alcohol. There had been no retention to speak of in the uterus, and the preservation of the tissues, if not perfect, is absolutely reliable. There is no reason to believe that there was any disease of the endometrium, and the abortion was probably due to mechanical causes. There is no ground for supposing the ovum to be pathological, as it is consistent in itself, and consistent also with other early ova described. The portion of decidua was cut into a complete series of sections 7 μ thick and stained partly with hæmalum and eosin, partly by the Gram-Weigert method for the recognition of fibrin.

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[1] By James Maclehose and Sons, Publishers to the University of Glasgow, 61, St. Vincent Street, Glasgow.

The blastocyst lies in a cavity in the decidua, oval in shape, and measuring 1·9 mm., 0·96 mm., and 1·1 mm. in its three diameters. The cavity is filled with maternal blood and is completely surrounded by decidua, except at one spot, where there is a small aperture on the surface, 0·1 mm. in diameter, filled with fibrin. There is no *Gewebspilz* such as is seen in Peters' or Graf v. Spee's ovum. The wall of the implantation cavity is lined by a layer of necrotic decidua and fibrinous deposit, and this is continuous all round except here and there, where maternal blood-vessels open into the chamber. This layer of dead or dying tissue is not everywhere in contact with the plasmodi-trophoblast; only at isolated points are large vacuolated masses of plasmodium applied directly to it. The glands are dilated, their epithelium is desquamated, and their lumen is filled with blood. The blood-vessels are greatly dilated, especially below the ovum, where the same blood-cushion is seen as in several other early ova. The decidua shows large numbers of invading leucocytes, and the decidual reaction extends through the whole shed membrane. The blastocyst measures internally 0·63 mm. in diameter. Its wall is somewhat folded in parts, and the longest diameter obtainable is 0·77 mm. The smaller figure represents more nearly the true internal measurement. The blastocyst wall consists—(1) of an inner lamella in which the cell outlines are not sharply defined, and the nuclei are very irregular in size, and many cells show double, treble, or even multiple nuclei; (2) of an extremely irregular formation which has definitely plasmodial characters. The two layers differ very markedly in the characters of the nuclei and staining reactions of the protoplasm, but they clearly form parts of one formation. The cellular layer we name, after Hubrecht, the cyto-trophoblast, and the plasmodial layer the plasmodi-trophoblast. The cyto-trophoblast is confined to the immediate wall of the blastocyst, and there is no sign of protrusions of the cellular layer into the strands of the plasmodium, although at one or two points a minute bud of the cyto-trophoblast is seen extending outwards.

The plasmodium forms an extremely irregular network, the spaces of which are filled with maternal blood. Isolated masses of the formation show all stages of vacuolation, from multiple small vacuoles to a spun-out reticular condition. This vacuolation of the plasmodium is probably produced by the secretion of a fluid containing digestive ferments, which cause coagulation necrosis followed by solution of the decidua, thus leading to enlargement of the implantation cavity. As the vacuoles enlarge, the plasmodium is reduced to fine strands, and, when these break through, the maternal blood takes the place of the secretion in the spaces of the meshwork.

Within the necrotic zone of the decidua, between it and the plasmodium and lying free in the blood-space, there is a nearly continuous layer of large cells; they are for the most part mononuclear, though some have lobed or multiple nuclei. While some of these nucleated masses of protoplasm may be cross-sections of plasmodial strands, the majority are certainly free cells. It is not possible to determine absolutely whether they be maternal or fœtal derivatives, but on the whole it seems more probable that they are degenerating decidual cells set free during the solution of the necrotic zone of the decidua.

The blastocyst is completely filled by a delicate tissue having the characters of mesenchyme. It does not form a special layer round the wall of the blastocyst, nor are there any processes indenting the wall, as in Peters' ovum.

The embryonic rudiment is to be recognized in the form of two vesicles which lie in a central space apparently produced by shrinking of the mesenchyme. The larger vesicle measures about 0·16 mm. by 0·14 mm., but it is, unfortunately, torn and collapsed. Its walls are formed of a single layer of cubical cells, arranged in an epithelial fashion, and it is attached at one point to the mesenchyme by a distinct stalk. The second vesicle is much smaller, measuring 0·08 mm. by 0·04 mm., and it is formed of flattened cells. Unfortunately, the plane of section has not cut both vesicles at one time, but a reconstruction in wax of the blastocyst has been prepared which shows the relation of the vesicles to one another. We take the larger of these vesicles for the amnio-embryonic cavity and the smaller for the entodermic vesicle, though they are somewhat separated from one another, probably by the shrinkage of the mesenchyme.

The amnio-embryonic vesicle as yet shows no differentiation between amniotic and embryonic ectoderm. Any other interpretation seems excluded by the absence of any area of the blastocyst wall which could be considered to be the embryonic ectoderm or of any thickening continuous with the wall which could be looked upon as the formative cell mass in which an amnio-embryonic cavity had not yet appeared.

The chief conclusions deduced from a study of the specimen may be summarized as follows:—

(1) The blastocyst is the youngest stage hitherto recorded of the human ovum.

(2) It reveals a stage, in all probability normal, in which the ovum is not yet attached and in which the trophoblast is almost wholly plasmodial.

(3) The plasmodium, which we consider to be of fœtal origin, is destroying the decidua, probably by enzyme action, producing a coagulation necrosis, followed by solution of the connective tissue and opening up of maternal blood-vessels.

(4) The embedding is chiefly effected by the destructive activity of the trophoblast, and the ovum probably penetrates into the connective tissue at a very early stage. The aperture of entrance is very minute (0·1 mm.) and is filled with fibrin. It has presumably closed in somewhat since the passage of the ovum, but there is no thickening of the decidual lips. In the light of our specimen it is probable that the large opening with the *Gewebspilz* is of secondary formation.

(5) The stage exemplified by Peters' ovum is probably reached by the proliferation of the cyto-trophoblast, which we see beginning in our specimen to form cellular columns or strands, which after disappearance of the necrotic zone of the decidua fix the ovum, while the primitive plasmodium is partly reduced to the syncytial lining of the blood lacunæ, and partly persists as the large masses invading the maternal tissue.

(6) The embryonic rudiment is from the first within the blastocyst, and consists, as had been anticipated, of a small entodermic vesicle and a closed amnio-embryonic vesicle surrounded and suspended by the early mesoderm.

(7) The early mesoderm is seen at a stage not hitherto observed in the human ovum. It forms a continuous undivided mass of tissue.

(8) The history enables us to estimate the age of the ovum with great accuracy, and the results correspond with such data of comparative embryology as are applicable. When considered along with the data obtainable from other early human ova considerable light is thrown not only upon their ages but also upon the relations of fertilization, embedding, and ovulation to menstruation and the significance of the menstrual cycle.

Case of Ovarian Pregnancy associated with an Intra-uterine Pregnancy.

By J. M. Munro Kerr, M.B.

Mrs. McD., a patient of Dr. Wilson's, of Greenock, came to Glasgow to spend the Christmas holidays of 1902. She delayed going home, however, on account of one or two attacks of abdominal pain, which she attributed to errors in diet. She supplied me with the following details: She is aged 27, has been married for two years, and has one child, now aged 11 months. She nursed the child for a few months, but then gave it up as the supply of milk was not sufficient. During the whole time of lactation she menstruated regularly. On November 20 she became unwell for the last time, and, as she had no period in December, she considered herself pregnant. There was no sickness or vomiting, however. On New Year's Day, 1903, she felt a little backache and pain in the lower part of the abdomen. This pain was in the form of spasms, but did not quite resemble intestinal colic, although she thought that was the cause of her discomfort. She had a second severe attack of pain on the night of January 8. I saw her on January 9, 1903, when I found her in bed, with a pulse of 90 and a temperature of 100·4° F. She had had some sickness and vomiting during the night; there was no vaginal discharge. On examining the abdomen it was found slightly distended and rigid, more especially over the right iliac region. On bimanual examination the uterus was freely movable, enlarged and pushed forward and to the left by a soft elastic swelling behind and to the right of the uterus. The diagnosis of extra-uterine pregnancy was made. The patient was removed to a nursing home. On January 13 I opened the abdomen; the operation presented no difficulties. On opening the abdomen a considerable quantity of blood welled up; in all about 2 pints of black blood were removed from the abdominal cavity. When I pulled up the right appendages I was expecting simply to find a ruptured tube. I was surprised to find the tube was quite free and undisturbed, and had no blood-clot attached to it; indeed, to the naked eye it appeared perfectly normal. On looking at the ovary, however, the thought of ovarian pregnancy at once occurred to me, for projecting from the inner margin of the ovary was a hæmorrhagic mass about the size of a walnut. With great care I removed the tube and ovary and placed the specimen in a weak solution of formalin. The completion of the operation presented nothing of note; all blood-clot was carefully removed, and the abdominal wound closed in layers. The uterus was unusually large and soft; I was very suspicious that there existed also a uterine pregnancy, and I informed the husband of my suspicions. The recovery of the patient was absolutely uneventful, and she returned home in about four weeks. Exactly on the two hundred and seventy-sixth day from the last missed period—viz., August 19, 1903—the patient gave birth to a full-time healthy child, so that my surmise that the uterus was pregnant at the time of the operation turned out to be correct, and I had, therefore, a unique example of coexisting ovarian and uterine pregnancy, the latter being undisturbed by the removal of the sac of the former.

NAKED-EYE DESCRIPTION.

The Fallopian tube appears slightly thickened and congested, but in other respects normal. This was confirmed by microscopical examination. There is slight œdema of the subperitoneal tissue, but the mucous membrane shows the normal structure. The ovary is considerably enlarged, principally as regards breadth, from hilum to free margin; it is somewhat sharply marked off into two portions (fig. 1); that next the broad ligament is about full size and presents the appearances of a healthy ovary of a woman in the childbearing period; the surface is fairly smooth and free from cicatrices; there is no indication externally of the presence of a corpus luteum. The other portion, corresponding to the "hæmorrhagic mass," is continuous with the preceding but somewhat sharply delimited from it by change of colour; down the sides of the mass blood-infiltrated ovarian tissue extends for some distance, but the greater part appears to be blood-clot. Rather towards the inner end of this there is a small rent, between the lips of which and projecting slightly is a mass of whitish fibrous tissue, which proved to be the end of the ovum. In the cut surface a large corpus luteum of pregnancy is seen occupying the inner end of the ovary close up to the hilum (fig. 2). Fully half the section is apparently normal ovary. The marginal portion, however, consists of blood-infiltrated ovarian tissue and a mass of blood-clot, in which, and separated from the corpus luteum by a considerable zone of blood-clot, is a small cavity containing a fibrous object of lighter colour, which Dr. Kerr regarded as a young ovum. The corpus luteum and ovum have both been cut somewhat to one side, the greater portion remaining in the posterior segment of the ovary.

Complete serial sections being impossible under the circumstances, Dr. Teacher cut a slice about 3 mm. thick from the posterior portion, including the greater part of the corpus luteum and complete section of the ovum. A second small portion of tissue was taken from above the corpus luteum in order to complete the section of that structure in its relation to the rest of the ovary and the blood-clot in which the ovum lay. The first block of tissue was converted into a complete series of about 400 sections 8 μ thick and stained by various methods. From a careful study of these, and adjustment to them of sections of the second block, an accurate picture was obtained of the relations of the corpus luteum, the rest of the ovary, the blood-clot and the ovum to one another in the longitudinal plane.

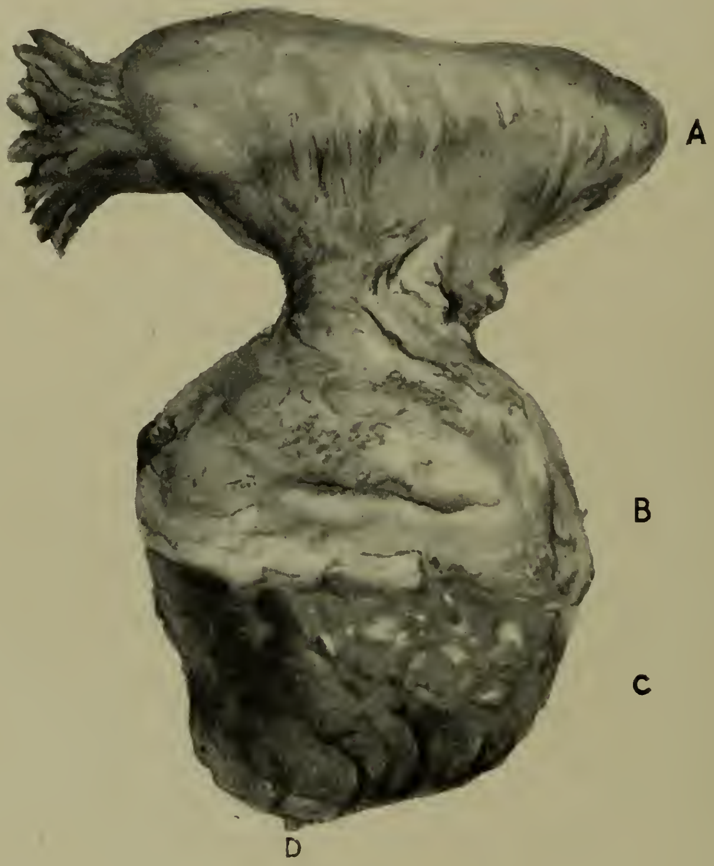

Fig. 1.

Ovary and tube when removed.

A Tube. B Ovary. C Ovum. D Rupture.

The ovary was sliced at right angles to this plane, and two blocks (from the anterior and posterior half) through corpus luteum and ovum were also taken out and cut into sections. By this means a complete picture of the relations of the ovum to the other structures in the transverse plane was also obtained.

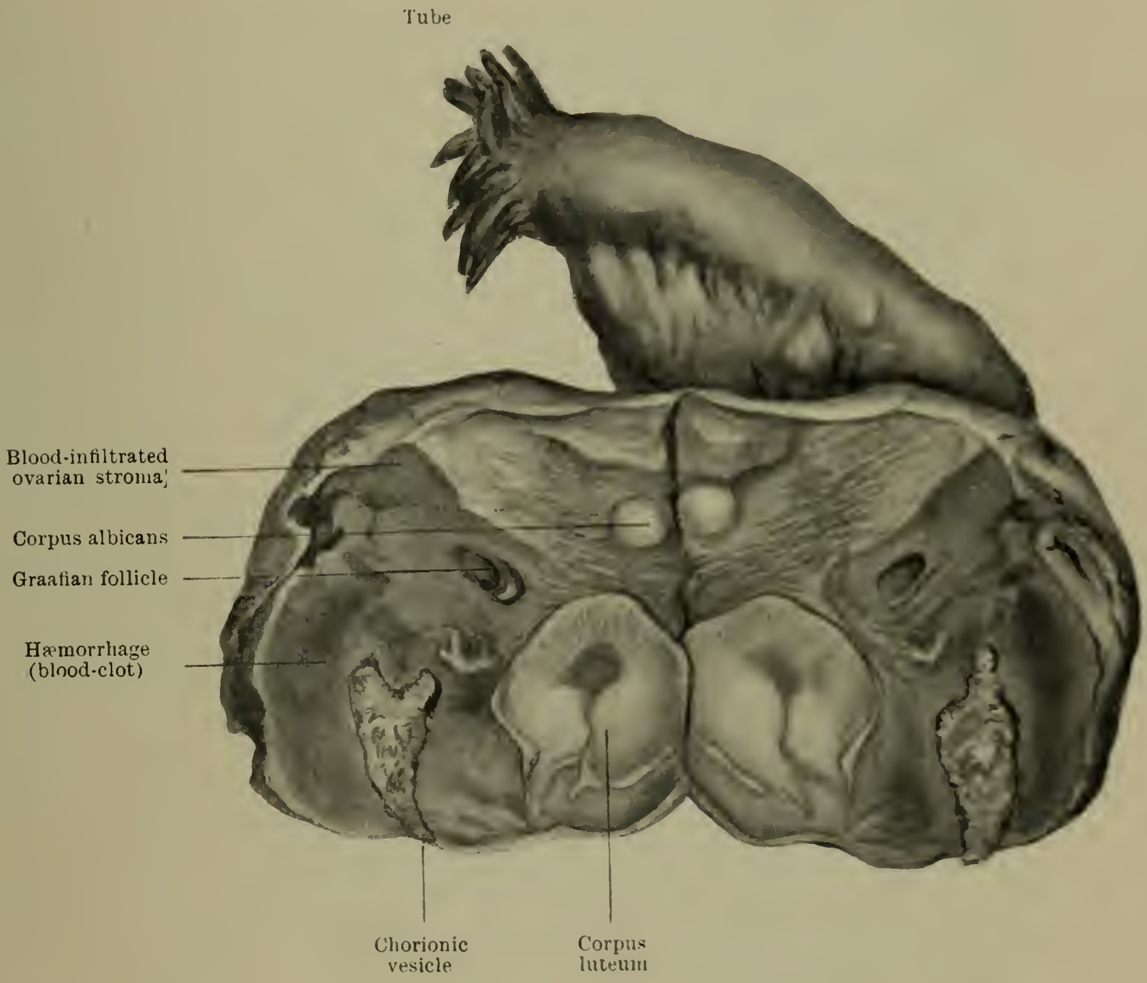

Fig. 2.

Ovary split open showing the relationship of ovum to corpus luteum.

Microscopic Appearances.

The ovum to the naked eye appeared to occupy a small cavity of irregular oval shape; this is found to be a space with walls composed of recent blood-clots lined to some extent by a thin, irregular layer of fibrin and tissue in a state of coagulation necrosis, to which the villi are attached by characteristic broad trophoblastic masses. The cavity is the intervillous space, for the most part empty of blood, with numerous villi crossing it to a central mass, which is the chorion. This has been folded and collapsed. Before this happened it probably measured little more than 1 cm. in diameter; its longest measurement now is 1·35 cm.

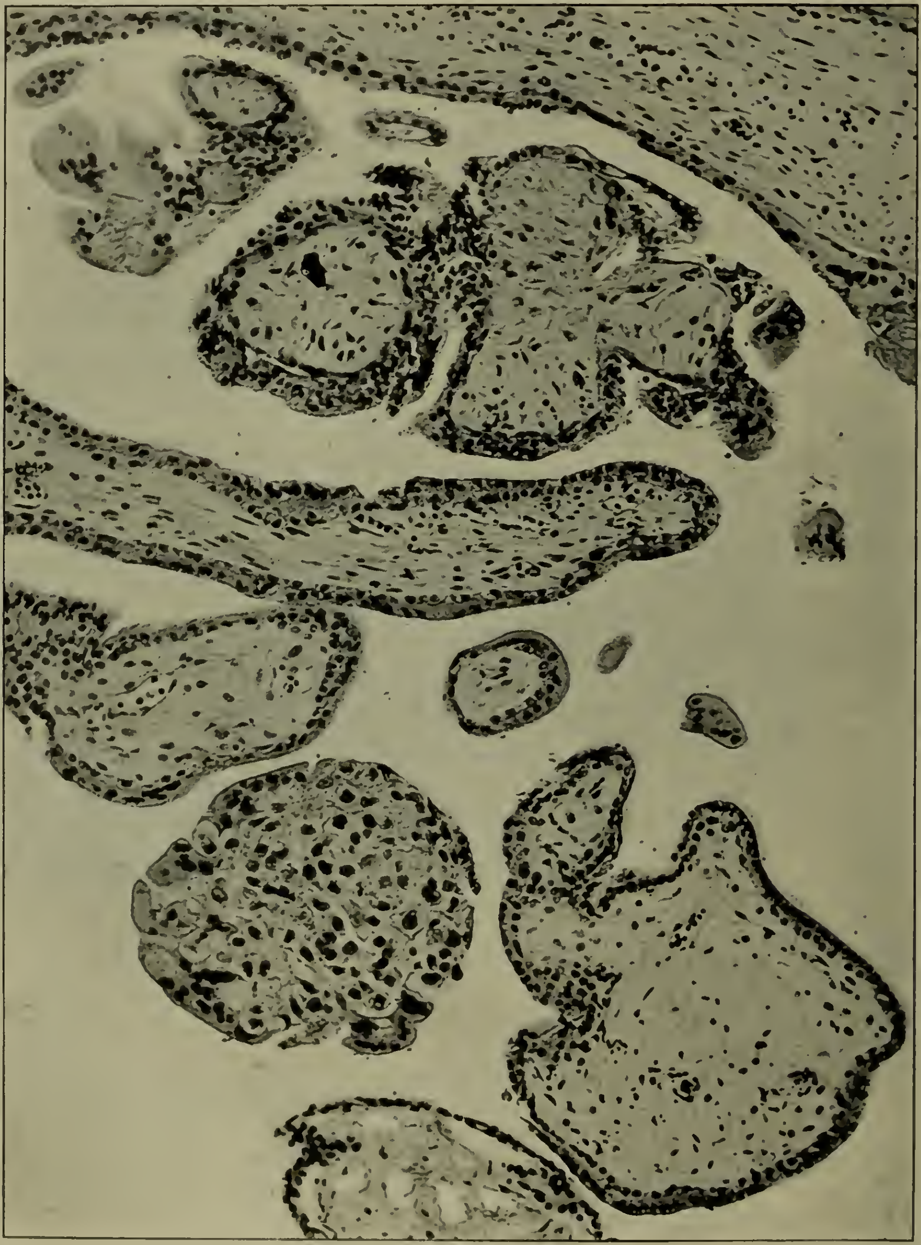

Fig. 3.

Chorionic villi (low power).

The villi are 2 mm. to 3 mm. in length (fig. 3). They are covered by the characteristic two-layered epithelium, identical in all respects with that of a uterine ovum of corresponding size (fig. 4). They contain vessels filled with nucleated red blood-corpuscles; the preservation is very good, numerous well-fixed karyokinetic figures being present in the epithelium. Remains of a small embryo were found within the blastocyst, but in so ragged a condition that it was not considered worth the time and trouble of reconstruction, but from its histological character it appears to have been little further advanced than Graf v. Spee's, and its age, as dated from the last menstrual period, is much the same. There is a thick ventral stalk containing blood-vessels full of nucleated red corpuscles. The yolk sac is much folded, but shows vessels in its wall.

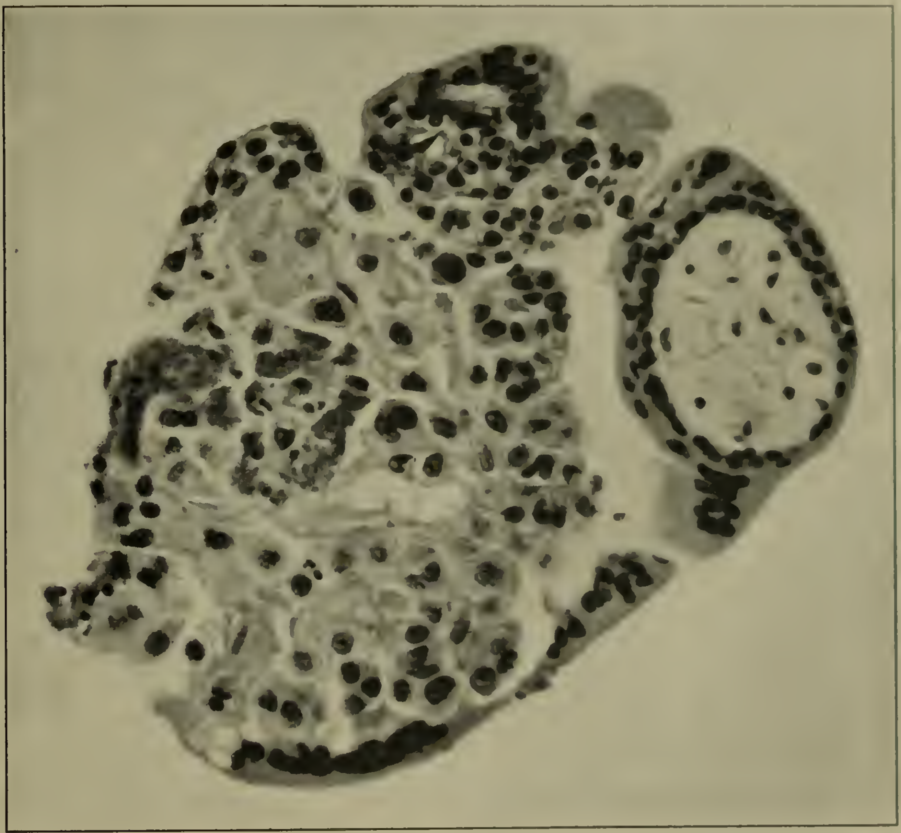

Fig. 4.

Chorionic villi (high power).

The ovum is almost entirely surrounded by blood-clot, which is of quite recent character. Only at one point does the ovum come close to the ovarian tissue, and that is opposite a gap in the wall of the corpus luteum (fig. 5). The sections show that the sides of the mass of blood-clot are clothed for a distance of about 1 cm. down the sides by a thin layer of ovarian tissue more or less infiltrated with blood, but there is a gap of about 2 cm. width in which the blood-clots are practically bare, although occasionally shreds of ovarian tissue extend more or less

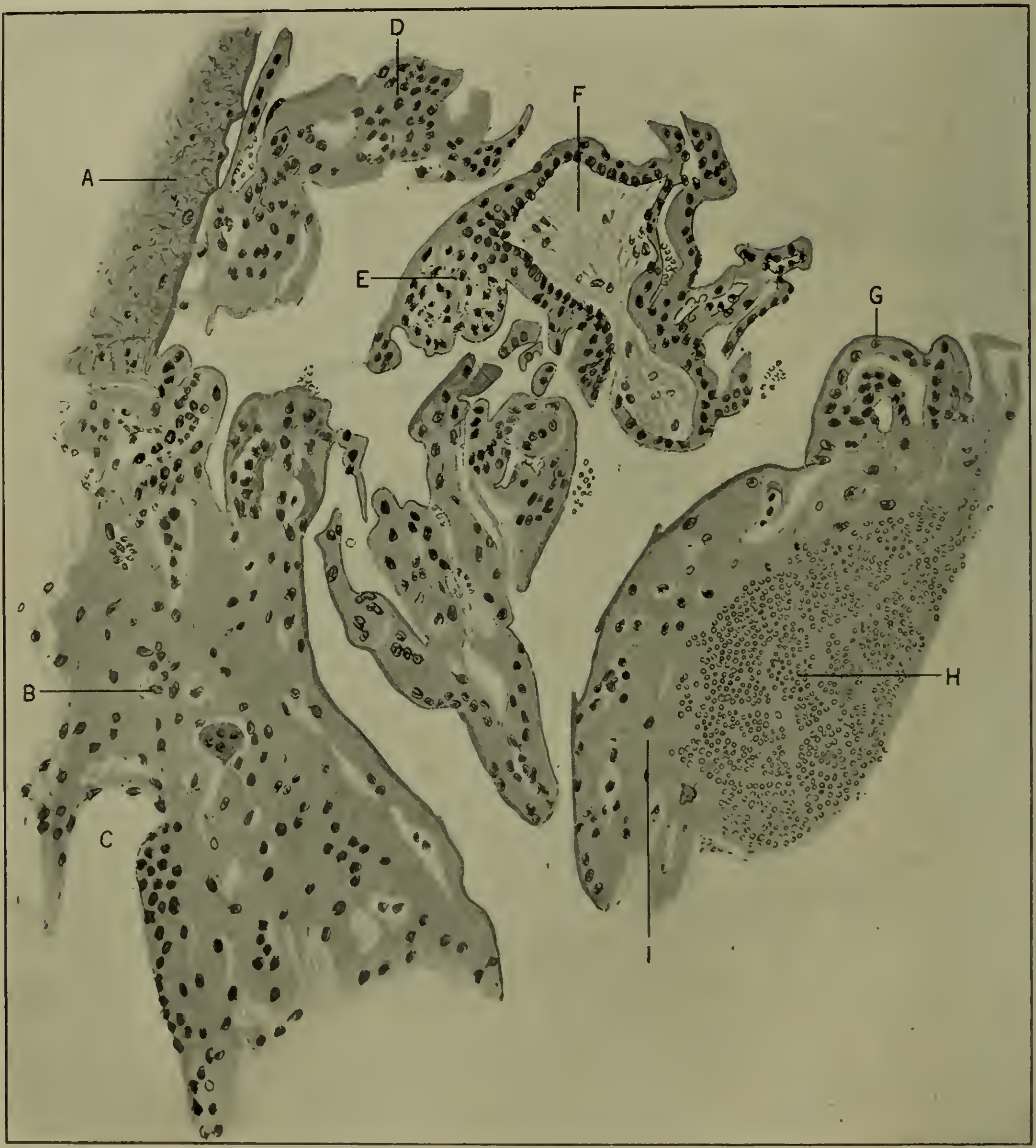

Fig. 5.

Showing ovarian stroma and chorionic villus.

A	Blood-clot.	E	Cell layer of chorionic epithelium.
B	Ovarian stroma.	F	Villus.
C	Ovarian blood-vessel.	G	Plasmodial layer (syncytium).
D	Plasmodial layer (syncytium).	H	Hæmorrhage.

I Necrotic layer of ovarian stroma.

over this. It is apparent, in fact, that extensive hæmorrhage had occurred, which appears to be situated in great part between the necrotic tissue next the villi and more living healthy ovarian tissue, and that this had formed a large coagulum surrounding the ovum, which was thus practically a fleshy mole, and would doubtless within a short time have been extruded from the ovary.

The villi are everywhere normal; there are the irregular masses of trophoblast showing exactly the constituents, cell-layer and syncytium, which would be present in a normal uterine ovum. The trophoblast is attached to ovarian tissue. The layer next the trophoblast is completely necrotic, while the deeper layers also present degenerative changes which fade off gradually into the normal connective tissues. There are a number of large cells, mononucleated and with relatively large cell bodies, scattered through the ovarian tissue in this neighbourhood and in other positions adjacent to the cavity in which the ovum lay. These may represent the interstitial cells of the ovary, but they may be swollen connective tissue cells. They are not unlike decidua cells, and if the latter view of their nature be accepted they are analogous to them in development, but they are few in number and do not constitute anything resembling a real decidua.

RELATION OF OVUM TO CORPUS LUTEUM.

The relations of the ovum to the corpus luteum constitute the crux of the preparation. This body presents the usual characters of a corpus luteum of pregnancy of the second month. Although it is close to the surface of the upper end of the ovary it has clearly not opened upon this aspect, its walls being completely intact in this direction. Towards the inner border of the ovary there is a gap in the wall of the corpus luteum, but in the present state of the organ this does not open on to the surface but into the mass of blood-clot containing the ovum. The corpus luteum is of globular shape, somewhat flattened in the antero-posterior plane of the ovary. Its circumference can be seen rounding in on all sides towards the opening. Its centre is occupied by the usual very irregular mass of young connective tissue and partly organized blood-clot. This is continued out through the break in the capsule into the necrotic ovarian stroma adjoining the ovum. The ovarian stroma surrounding the corpus luteum passes in between the corpus luteum and the blood-clot, up to the margin of the fibrin mass protruding from the gap in its wall. The apparent width of this gap in the wall of the corpus luteum is somewhat diminished if allowance be made for the dark masses between its lips, which are necrosed portions of the corpus luteum.

POSITION OF THE OVUM.

It is evident that the ovum lies opposite the gap in the corpus luteum and extending considerably beyond it in all directions. It is rather larger than the corpus luteum and is entirely outside of it. It has obviously lain within a cavity hollowed out in the ovary, and now greatly increased in size by distension with blood-clot.

From what is known of the powers of movement of the spermatozoon it may be taken for granted that it obtained access to the ripe Graafian follicle through the rupture of that structure on to the surface of the ovary. It is also obvious that the ovum passed out of the corpus luteum by destroying a portion of the wall. This is clear from the large size of the gap in the corpus luteum compared with that which is found a few weeks after the normal escape of an ovum from a follicle, and from the presence of necrosed masses of corpus luteum tissue in the lips of the orifice.

From the evidence supplied by the Teacher-Bryce ovum it is clear that the ovum at the time of embedding is an extremely small body, but that it produces destruction of a mass of tissue much larger than itself. It appears probable, therefore, that in the present case the ovum did not travel far from the Graafian follicle, but after destroying a portion of its wall it embedded itself in the vascular ovarian stroma, just beyond the wall of the follicle, a distance which may be judged by the narrowness of the capsule of stroma intervening between the corpus luteum and the ovum chamber. The extensive splitting up of the ovary followed the further growth of the ovum outwards into the ovary instead of backwards into the cavity of the corpus luteum. With the exception of this gap in its side the corpus luteum is intact, and it is entirely of the normal shape and structure.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) expressed the thanks of the Section to the authors for their communication and demonstration, which were of the highest value and were in some respects unique.

Dr. EDEN said that he should like to express his admiration for the fine piece of original work which Dr. Teacher had laid before them. The ground covered was so extensive that he felt totally unable to discuss either the data or the conclusions advanced by the author on the spur of the moment, but he felt sure that the early human ovum of Teacher would become one of the accepted landmarks in human embryology.

Dr. BLACKER wished to express his thanks to Dr. Teacher and to Dr. Munro Kerr for the very beautiful specimens they had shown, and to the former for the very interesting demonstration he had given with the epidiascope. There was no subject of greater interest than the development of the early human ovum. He thought, therefore, that the Section was to be congratulated upon having had this very important specimen brought before them, and that Dr. Teacher was to be congratulated on having obtained it in so relatively good a state of preservation. Personally he was disappointed to find that comparatively little had been said about the embryo itself and that the major part of the demonstration had been taken up with the extra-embryonic portion of the ovum. Their knowledge of the early stages of development of the trophoblast and of the chorion was now fairly complete, but they were still entirely ignorant of the manner in which the human amnion developed, and he hoped that they might have heard from Dr. Teacher something which would help to clear up this mystery. Was the human amnion developed by invagination of the epiblast or by the formation of its cavity in a solid cell mass? Unfortunately the present ovum, although apparently the youngest ever described, threw no light upon this important point. He thought that perhaps the most interesting fact, and one hitherto undescribed, was that the interior of the blastocyst was entirely filled up with a solid mass of mesoblastic tissue. It was difficult to believe that the sketch purporting to show the relations between the amnio-embryonic cavity and the entodermic vesicle was in reality correct. It certainly appeared as if the two structures had been artificially separated and that their anatomical relation, as shown on the screen, was not really the correct one. Although Dr. Blacker was quite prepared to accept all that Dr. Teacher had said as to the extra-embryonic portions of the ovum, he felt it impossible to believe the deductions drawn by the authors from the specimen as to the relations of the various parts of the embryo itself. The whole subject was, however, one of absorbing interest, and the paper and demonstration had raised so many important problems that discussion was almost impossible until they had had time to carefully study the paper and the drawings. Dr. Teacher's estimate of the age of the specimen was most interesting, but at the same time it must be remembered that two ova of the same size were not necessarily of the same age.

Dr. TEACHER replied to Dr. Eden that nothing was known about the movements and behaviour of the human ovum during the early days after fertilization. The assumption that imbedding occurred on the seventh day after fertilization was founded on analogy with the ovum of the guinea-pig. In regard to Dr. Blacker's criticism, Dr. Teacher agreed that the single section shown and the brief explanation, which was all time permitted, hardly justified the weighty conclusions regarding the nature of the supposed embryonic rudiment and amnion formation. The conclusions were only reached after consideration of all the sections and reconstruction of the rudiment. The full evidence would be found in the memoir which will be issued from the Glasgow University Press within the next three or four weeks.

Obstetrical and Gynæcological Section.

July 9, 1908.

Dr. Herbert Spencer, President of the Section, in the Chair.

Abdominal Hysterotomy for Chronic Uterine Inversion: A Record of Three Cases.

By F. W. Nicol Haultain, M.D.

Thanks to the advance of obstetrics, chronic uterine inversion is now but seldom met with, and many eminent obstetricians have never even seen a case. From this aspect, therefore, its treatment must be considered of anything but engrossing interest. On the other hand, when it is remembered that if it does present itself the complication is one of great severity and leads in many instances to a fatal termination, and at the best to confirmed invalidism, the subject assumes a position of greater importance. As I have had the good fortune (if such it might be called) to have had three cases under my care, I have presumed to suppose that their description, and treatment by a new method of surgical procedure, might be worthy of bringing before the Section.

In 1901 I recorded my first case, and had intended demonstrating the operation at the Cheltenham meeting of the British Medical Association, but was crowded out. The cases are as follow:—

Case I.

Mrs. W., aged 24, 2-para, suffered from partial inversion of the uterus (the cervix still being felt). This she had acquired at the birth of her second child nine months previously—the result of a midwife attempting to deliver the placenta by pulling on the cord. After delivery there was severe bleeding, and her doctor, on being called in, found the patient collapsed. An attempt at reduction was immediately made by taxis but proved futile, and the hæmorrhage had to be controlled by vaginal plugging. In a few days another attempt at reduction was made by elastic pressure, which was inefficacious, and she was removed to a cottage hospital, where the method of reduction by Aveling's repositor was tried for a week without any avail. She now decided to return home and for some months remained fairly well, but hæmorrhage again ensued and steadily increased. As she was becoming profoundly anæmic and very weak, she was sent with much risk to the Deaconess Hospital, Edinburgh, to be under my care.

On examination the fundus uteri was felt in the vagina, protruding through the gaping cervix, and an attempt at manual reduction produced such severe bleeding that plugging had to be resorted to. On account of her extreme exsanguinity, I decided to try to reduce the malposition by the abdominal manipulation of Thomas, viz., dilatation and traction on the broad ligaments. This I found absolutely futile, and determined to proceed to incision of the uterus as subsequently described. She made an uninterrupted recovery, and has since borne two children at full time.

CASE II.

Mrs. B., aged 21, primipara, was sent to me by Dr. Connel, of Peebles, with complete inversion of twenty-one months standing, which had resulted from traction on the cord after delivery by a neighbour skilled (?) in delivery cases. After the birth a considerable amount of hæmorrhage took place, and continued more or less at irregular intervals for eighteen months, by which time she was becoming exsanguine and weak. Dr. Connel was now sent for and discovered uterine inversion, which he tried to reduce by Aveling's method, without avail, the attempt being productive of considerable bleeding and much pain. When asked to see her, the hæmorrhage on simple examination was so great from the spongy protruding fundus in the vagina that I proposed at once to perform abdominal hysterotomy. This was easily accomplished, with complete recovery, and I have since learned that she has had a full-time living child.

CASE III.

Mrs. W., aged 24, primipara, was confined naturally eleven months previously. Dr. Reid attended, and left her shortly after with conditions apparently normal, the uterus being abdominal and well contracted. Some hours later she complained of severe bleeding, which required firm vaginal plugging for its control. On removal of the plug the bleeding had ceased and no further examination was made. From time to time, however, during the following eight months, on exertion, the womb used to protrude between the thighs, and was always associated with severe bleeding, which, however, stopped when she lay down and pushed the womb back. But for three months the bleeding had been continuous and she had become so weak that she was a complete invalid.

On examination I found a soft body in the vagina continuous with its roof without any ridge of demarcation. This, when the patient bore down, protruded from the vulva and could be thoroughly inspected. The diagnosis of complete uterine inversion with prolapse was thus simply made. A cystic pelvic swelling about the size of a cocoanut could also be felt bimanually. As the uterus bled freely on the slightest manipulation and the patient was extremely anæmic, I decided without further delay to reduce it by abdominal hysterotomy. This was very easily performed, and the uterus ventrofixated after the removal of an ovarian and parovarian cyst which were also present.

CLINICAL FEATURES.

As regards the causation of the inversion in these cases, the last is of special interest, as it was attended throughout by a qualified medical man. Here it would appear as if it had spontaneously developed during the night following the confinement, as the doctor distinctly felt the uterus to be abdominal before he left. This, though the exception, is quite probable, and is quite in keeping with those cases of recurrence after replacement. As is well known, the most common factor in the production of uterine inversion is the attempt to deliver the adherent placenta by traction on the cord. This accounted for two of the cases. Funic traction as a common factor in the production of inversion is denied by Atthill in a recent article,[1] who ascribes it chiefly to fundal implantation of the placenta. Though there are many claims for the latter being a predisposing factor, it does not account for the frequency of inversion when funic traction was commonly adopted, as compared with its rarity in the present day, when such is severely condemned.

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[1] *Brit. Med. Journ.*, May 23, 1908.

In each case the only symptom complained of was hæmorrhage. This was particularly profuse, as might be expected, when the displacement occurred, but afterwards recurred at frequent irregular intervals to such an extent as gradually to bring the victim to a state of great exhaustion. In only one instance was there any evidence of the "shock" which is so constantly described in text-books as occurring at the onset of the complication, and in this case it was more of the nature of collapse from excessive blood loss. In no instance were the familiarly expressed "dragging down" pains complained of, nor, curiously, were bladder symptoms prominent.

METHOD OF TREATMENT.

The reduction of chronic inversion has at all times been considered a matter of great difficulty, and on many occasions so insuperable that removal of the uterus has subsequently had to be resorted to. The usual methods adopted are attempts at reduction by forcible taxis and steady continuous elastic pressure on the inverted fundus for days or even weeks. The first is only occasionally successful and the latter irksome, painful, frequently useless, and not without danger. Forcible reduction by taxis is a mode of treatment attended with considerable danger from rupture of the vagina and peritonitis, so much so indeed that Thomas, after an experience of nine cases over fifteen years, not inappropriately remarks (as far as the present paper is concerned) that "he would prefer to trust a patient to the operation of abdominal section than to that of taxis at the hands of a rough, unintelligent and inexperienced surgeon."[1]

This is only natural to expect when the true conditions are analysed. The walls of the chronically inverted organ are in a state of complete involution and retraction, and have thus little elasticity. There is thus not merely the resistance of a constricting ring to be overcome, but that of the inelastic walls in their entirety, and, further, there is the resistance offered by the adherent peritoneal surfaces of the inverted fundus That reduction by taxis is successful

[1] "Diseases of Women," Macnaughton Jones, p. 313.

so often as it is, is surprising, and that the pressure necessary to obtain it is frequently so great as to cause severe constitutional symptoms and even sloughing of the uterus and its surroundings, must form a natural sequence.

The reduction by continued elastic pressure has its greatest exponent in Aveling, who successfully treated eleven cases—probably a unique experience. This he accomplished in an average of forty hours. Subsequently he met with a case quite irreducible. Naturally his results have stimulated others, but with very varying success, and many fatal cases are recorded from sloughing, rupture of the vagina, and peritonitis from long-continued and forcible pressure. In two of the cases I operated on, this method was attempted without success, continued pressure having been exercised for seven days and a fortnight respectively. A successful case is recorded by Jaggard after thirty-three days. Poney in five cases published failed once; one of his cases died after reposition, while in a third the fundus became gangrenous and was exfoliated.

From the rapid advance of intraperitoneal surgery within recent times it is only natural that its aid in the reduction of inversion should have been turned to. Thus Kustner and Piccoli, by posterior colpotomy and incision of the entire uterus, were able to acquire the desired result. According to Oui this was performed eight times, with four failures and four successes, while Taylor, Peterson, Oui, and others have performed the same operation by an anterior vaginal incision. Oui in thirteen cases had but one failure, but the description of his operation shows it to be complicated and difficult, while the after-treatment of drainage and packing is undoubtedly irksome.

Preferring, as I do, however, the abdominal route to the vaginal in all intraperitoneal pelvic operations, I determined on the first opportunity to try it, and found the reduction so simple and satisfactory that I have repeated it with equal satisfaction, both as regards simplicity of performance and completeness of results, in the two succeeding cases I have been called upon to treat.

The operation, which I have named abdominal hysterotomy, is performed in the following manner: After the usual thorough disinfection of the skin of abdomen and vagina, the peritoneal aspect of the pelvis is exposed by the usual median abdominal incision; the site of the inverted fundus is now seen represented by a narrow transverse slit (fig. 1); into this a pair of ordinary dressing forceps is passed and opened as widely as possible to break any peritoneal adhesions in the inversion funnel (these were found in two cases). Each round ligament, as it passes into the slit, is now seized by a pair of Kocher forceps and pulled upwards and forwards, while at the same time an assistant pushes the fundus uteri upwards from the vagina. By this means a thick ring, formed by the uterine walls, is seen surrounding the slit formed by the inverted uterus (fig. 2). This ring is divided posteriorly, the incision passing through the entire thickness of the uterine wall. By this means partial reduction is obtained by the vaginal taxis, and the still constricting portion of the uterus exposed (fig. 3); through this the incision is continued until a sufficient opening is formed to permit of the introduction of the forefinger to below the fundus, after which firm, regulated pressure can be exercised upon it and reduction easily secured. An incision in the posterior uterine wall, a little over 1½ in. in length, is now left (fig. 4), which can readily be united by two or three deep sutures of silk or chromic gut, covered by a superficial Lembert of catgut. The manipulation is of the simplest, and on the

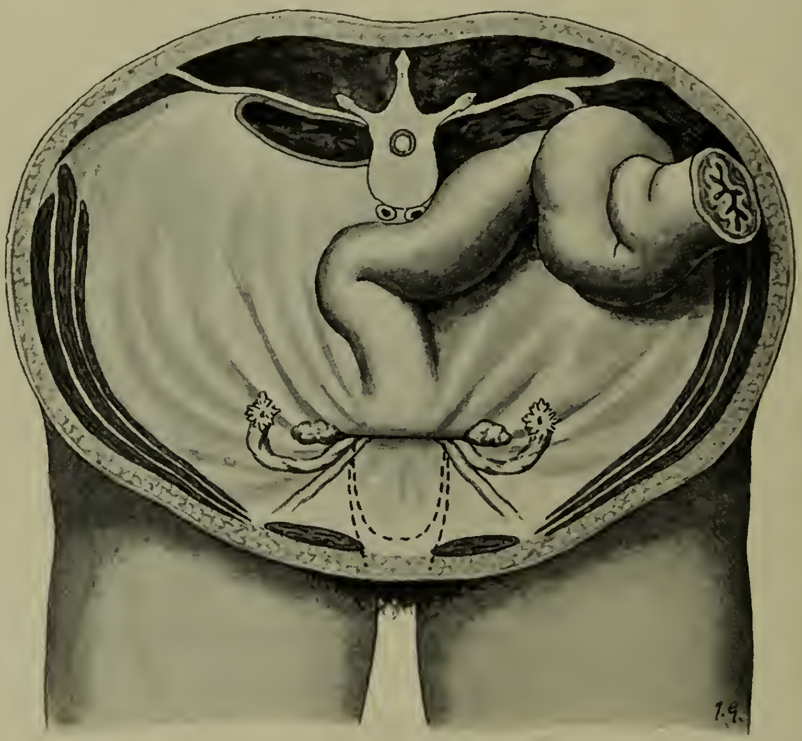

FIG. 1.

Appearance presented on opening abdomen, showing transverse slit of inverted fundus. The dotted line shows inverted uterus in vagina.

three occasions I have performed it, offered no difficulties. In the first case smart hæmorrhage from the uterine incision and needle punctures required some purse-string superficial sutures for its control, but in the other cases hæmorrhage was very slight. So simple and satisfactory, indeed, was the manipulation in my first case that perhaps I was more than ready to adopt it in the others, with, I am glad to say, equally satisfactory results.

It may be well to compare the various methods of reposition :—

(1) Immediate taxis: Except in acute cases this is seldom successful, and is generally associated with hæmorrhage from the soft, inverted fundus, which leaves the patient in a weakened condition for further treatment; from the force required there is danger of rupture of the vagina and peritonitis. It is thus hardly worth consideration and should, in chronic cases, be avoided.

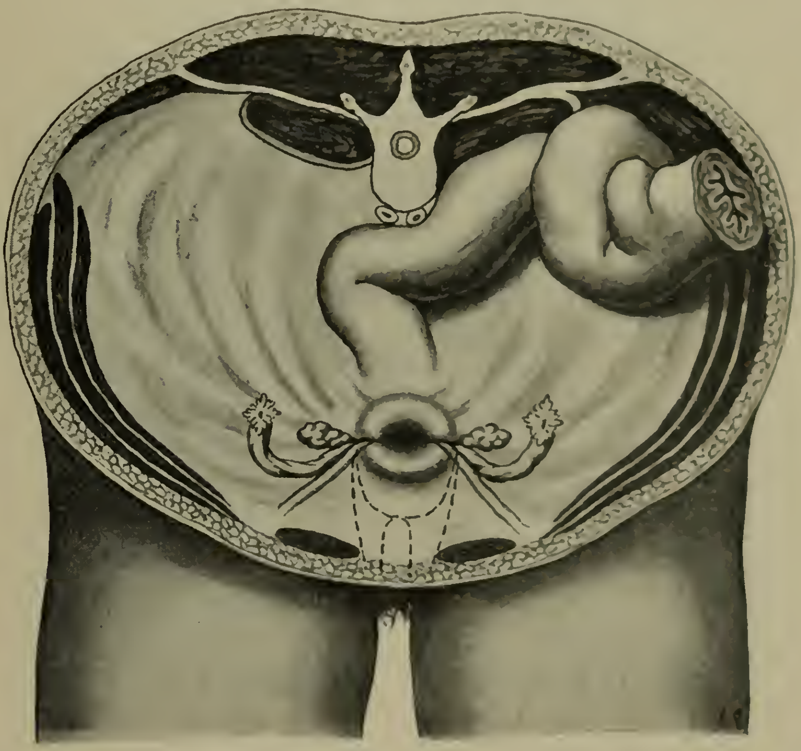

FIG. 2.

Appearance presented when inverted fundus is pushed up by finger in vagina, showing ring round slit.

(2) Persistent continued pressure, as adopted by Aveling and Tait: (*a*) This is by no means always successful, even in expert hands;

(*b*) It is usually associated with considerable bleeding; (*c*) It is extremely painful and irksome; (*d*) It has been associated with the death of the patient and sloughing gangrene of the uterus.

(3) Vaginal operations: (*a*) They are by no means always successful; (*b*) They entail incision of almost the entire extent of the uterine wall from cervix to fundus; (*c*) Hæmorrhage from the inverted fundus is most difficult to control and is always present; (*d*) In posterior colpotomy the majority of cases remain in a fixed retroverted or flexed position from the severe displacement at the time of operation and subsequent adhesions; (*e*) In anterior colpotomy the same difficulties occur as in posterior, with the exception of (*d*); on the other hand, both in the cases of Taylor and Peterson, difficulty of complete closure of the uterine incision was met with, while the gauze packing of the wound made the after-treatment irksome.

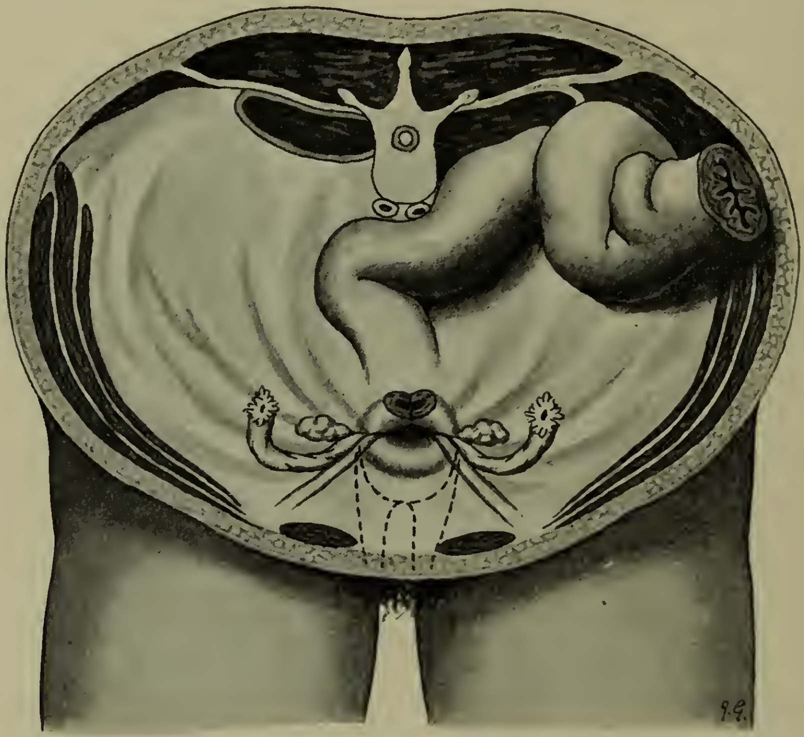

FIG. 3.

Site of incision through posterior uterine wall, commencing at ring.

In posterior abdominal hysterotomy the following advantages may be claimed: (*a*) Absolute simplicity of the operation, fifteen to twenty minutes being ample for its performance; (*b*) Small uterine incision;

(*c*) Easy control of hæmorrhage, should it occur, which is the exception; (*d*) No subsequent displacement of uterus; (*e*) So far as my three cases can show, uneventful recovery and subsequent uncomplicated pregnancy in two out of three cases.

Forming a legitimate conclusion from the data before me, I feel that should I at any time have the opportunity of dealing with another chronic case I shall unhesitatingly recommend abdominal hysterotomy without any attempt at taxis, immediate, or steady elastic, which, from its irksome nature, uncertainty, predisposition to bleeding, and even dangerous results of pressure, seem to me more risky than opening the abdomen, which practically represents the whole danger of the operation described; while the main advantages over the vaginal operations are greater simplicity, avoidance of hæmorrhage, and, should it occur, its ready control.

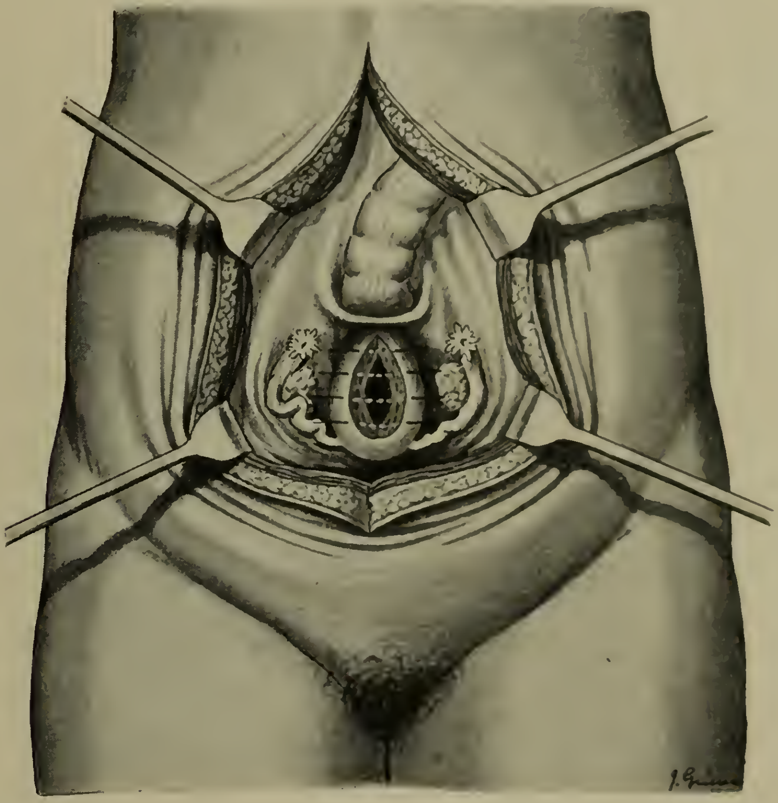

FIG. 4.

Reduced uterus, showing incision in posterior wall, with deep sutures in situ.

It is, perhaps, invidious to make comparisons from only three cases, but fortunately this must be considered a large experience, and having met with such unqualified success I thought the treatment adopted worthy of bringing before the notice of the Section, in order that it might be discussed by those who have had larger experience in the treatment of such cases, and at the same time to bring forward a cure for this serious condition conservative in its object, simple in its adoption, and comparatively free from risk.

DISCUSSION.

Dr. CHAMPNEYS asked the author if he could describe exactly how Aveling's repositor had been used in his cases.

Dr. HAULTAIN replied that he had not used it himself, but that it had been used by doctors whom he considered competent.

Dr. CHAMPNEYS (resuming) said that he asked because, out of some six or eight cases which he had seen, Aveling's repositor had never failed, but it should be used with skill and intelligence. Details were important. The amount of force necessary and desirable was not large but very small, being from 1 lb. to 2 lb., and acted not by violence but by persistence, which would overcome the elasticity and retraction of the uterus, and in most cases, he had no doubt, adhesions also, for these (except when cicatricial) yielded readily to continuous force. The three cups of the repositor should be used with judgment—the largest at first, to get the fundus within the cervix, then the middle-sized or the smallest, to get it thoroughly reinverted. When this occurred the cup was incarcerated in the uterine cavity and had to be recovered. This was easily done by "reversing engines" and attaching the elastic bands to the foot of the bed, when it was readily withdrawn in a short time. In most of the cases which he had seen the reinversion took something like twelve to twenty-four hours, in one case three days. The case should be watched, pain (which only occurred for a short time after all) relieved by morphia if necessary, the vagina carefully disinfected when the cup was changed, and oftener if necessary, and the temperature observed. He had not seen serious symptoms in any of the cases. As regarded taxis, personally he had never seen it succeed, though several times attempted, even by relays of doctors, but when one read of rupture of the vagina by this method it must surely be due to one of the "rough surgeons" mentioned by Dr. Thomas, and ought never to occur if taxis were properly applied—that is, if the outer hand supported the inversion ring and the inner hand pressed on the uterus and not on the vagina. Fatal cases must be due to want of skill. Dr. Champneys felt somewhat surprised that the author had not referred to his very distinguished fellow-countryman, Matthews Duncan, whose writings on this subject ought to be well read and well known. If elastic reposition failed, doubtless it might become necessary to operate with the knife. If, say after three or four days, no prospect of success appeared, or if the patient's temperature rose and she appeared to be injuriously affected, then elastic reposition should be discarded, antiseptic treatment to the vagina applied, and another sort of operation contemplated. This should occur after an interval to allow the patient to recover from any abrasions, &c. If a cutting operation were decided on, then he thought Dr. Haultain's operation was superior to others. Incisions on the inner surface of the uterus were contrary to reason, for it was the outer and not the inner aspect of the uterine wall which required splitting, as this was the surface which would give way if violent splitting occurred. But he thought that Dr. Haultain had not proved that elastic reposition was either unsuccessful or dangerous when properly used, still less that abdominal section and hysterotomy was a justifiable procedure in the first instance.

Dr. HEYWOOD SMITH said he considered the reason why so many cases of attempted reposition of chronic inversion of the uterus by manual taxis failed, and occasionally cases where repositors were used, was because the pressure was exerted in the wrong place, namely, directly on the fundus, thereby causing a lateral bulging which rather hindered reposition. He remembered a case he had under his care at the Hospital for Women, more than thirty years ago, of chronic inversion which had existed for some months and which yielded to manual taxis in under half an hour. It was necessary to put the patient under chloroform to obviate any reflex contraction of the uterus; the uterus should then be grasped firmly in the hand, and, before any actual attempt at reinvagination was made, the uterus should be steadily and firmly squeezed, in order to empty it of blood, the hands being changed when they became fatigued; and when it was felt to be lax the thumb should be pressed into the insertion of one of the oviducts, where the uterine walls are thinner, and after a time the uterus would yield at that point and reinvagination would readily take place.

Dr. AMAND ROUTH did not think that traction on the cord was as frequent a cause of inversion as forcible fundal pressure during uterine passivity. As regards treatment he had found that manual taxis was useless in chronic cases. On the other hand, he had never failed to reduce an inverted uterus by means of Aveling's repositor, and he believed that if properly applied failures would be extremely rare. Pressure must be applied in the axis of the pelvis, and the patient could be kept partially under morphia if necessary. He advised a light gauze packing of the vagina round the inverted uterus and the cup of the repositor to prevent the slipping of the cup off the fundus. Supposing, however, that reposition was not accomplished, he thought that Dr. Haultain's operation was a most valuable one and was, at all events, very much superior to vaginal or abdominal hysterectomy, which had sometimes been performed in unreduced cases.

Dr. FRANK E. TAYLOR said that he had seen and assisted in the treatment of one case of chronic inversion of the uterus (previously published by Dr. Hellier) of nine months' duration, which had been reduced with the utmost ease by the application of Aveling's repositor, reduction having taken place within twenty-four hours. Judging from the limited experience of a single case he (Dr. Taylor) could fully endorse the remarks of Dr. Champneys and Dr. Amand Routh, and he considered that Aveling's repositor should have been tried by Dr. Haultain himself before resorting to abdominal section, which in at least his first two cases would probably not have been called for. Dr. Haultain had exaggerated the difficulties and dangers of Aveling's repositor, which, if carefully and skilfully used, caused no greater pain than can be controlled by a hypodermic of morphia, and much less irksomeness than the confinement to bed for two or three weeks which the simplest cœliotomy necessitates, for in the case he (Dr. Taylor) referred to the patient was up and about in a few days as if nothing had happened.

The PRESIDENT (Dr. Herbert Spencer) thought that the author's operation was an excellent one for those cases of chronic inversion which could not be reduced by Aveling's repositor. It was, in his opinion, not an operation which should be performed until Aveling's instrument had been tried and had failed. Aveling's experience showed that it would rarely fail, and he (the speaker) had not seen a case in which the reduction was not effected without difficulty or great pain. Aveling's repositor was an instrument of which British gynæcology had every reason to be proud, but the instrument should be the instrument designed by the inventor, the description and method of use of which were to be found in the *Transactions of the Obstetrical Society*, vol. xx. The instrument had been often altered since Aveling's time, and always for the worse. He held in his hand the Obstetrical Society's copy of Denucé's great work on "Uterine Inversion" (1883), in which was a protest, in the handwriting of Aveling, against the misrepresentation of his instrument and its action. The chief points which were necessary for success with the instrument were: (1) the choice of a cup of suitable size; (2) pressure by means of elastic bands in the axis of the pelvis (easily obtained by bending the German silver stem); (3) ascertaining by frequent examination that the cup was in place and that the elastic bands were stretched. He thought that the instrument thus used would very rarely fail to reduce a chronic inversion of the uterus. He asked the author whether, by means of Bossi's dilator, it might not be possible to dilate the uterus from the abdomen and so effect the reduction without resorting to division of the uterine wall.

Dr. HAULTAIN expressed surprise at the uniformly successful results acquired from Aveling's method by those who had spoken, as such were very different from what is published by many authorities. It seemed to him merely a question of opinion, in these chronic cases, what method should be adopted. Personally he would prefer to perform this simple operation, which he thought might be guaranteed to be successful, rather than subject his patients to a probably lengthy period of pain and discomfort with by no means a certainty of cure. He thanked the Section for the manner in which they had discussed the paper.

Menstruation and its Relationship to the Calcium Metabolism.

By W. Blair Bell, M.D.

We have long been in possession of the knowledge that menstruation is a normal cyclical process which occurs in all healthy and genitally active females, commencing at puberty and ceasing at the period of life known as the menopause. Unfortunately there is little else concerning this function that can be called "knowledge" at the present time. However presumptuous, therefore, it may be of me to claim your attention in reference to this subject, I feel I cannot do any harm in placing before you a group of facts hitherto unexplored, and giving you my deductions based on these facts.

Before bringing forward my own ideas and work on menstruation I should like to recall briefly the work and views of others in the past. How far their conclusions may appear to satisfy the ordinary rules of deduction, and to fit in with clinical and experimental evidence, I shall not have time to gauge in detail, and after all it is better for each to decide for himself. Conviction rarely follows persuasion in scientific circles, whatever may obtain in more legal surroundings.

There appear to have been two schools of thought: the ancient, extending from the earliest time up to about 1830, and the modern. I hope an ultra-modern will soon hold sway.

The history of the world and of medicine teems with illustrations of the spirit of inquiry with which man has always been imbued in regard to the functions of the more subtle sex.

Hippocrates (whom we all consult when we are in doubt) in his "Aphorisms" established many facts well known to us in the present day. He was, if I read correctly between the lines, far ahead of many latter-day observers, in that he recognized in menstruation not only a local but a general disturbance, else how could he have written:—

"Hæmoptysis in a woman is removed by an eruption of the menses" [15];

Or "In a woman when there is a stoppage of the menses a discharge from the nose is good" [16].

Again: "If a woman who is not with child, nor has brought forth, have milk, her menses are obstructed" [17].

And: "If you wish to stop the menses in a woman, apply as large a cupping instrument as possible to the breasts" [18]—a method of treatment recently "rediscovered" by Polano [25], who either has not read Hippocrates himself or is under the delusion that no one else has.

I do not think we can glean much of scientific wisdom in the succeeding centuries, during which the influence of Hippocrates was paramount, so that we can next pick up the thread of our historical inquiries in the writings of Ambrose Parey. Among these writings we find the following with reference to the onset of the catamenia in women: "But then especially it beginneth to flow, and a certain crude portion of the blood to be expelled, being hurtfull and malign otherwise in no qualitie, when nature hath laid her principal foundations of the increas of the bodie, so that in greatness of the bodie she hath com as it were in a manner to the highest top, that is to say, from the thirteenth to the fiftieth year of our age" [22]; an opinion which, as I shall point out later, is one of more weight than appears on the surface.

The next of the older authorities whose opinion I shall quote is Dr. Peter Shaw, who flourished during the first half of the eighteenth century. I find in the third edition of his book, which I possess, the following: "If the patient find no relief from these remedies, it is proposed by some to open a vein in the arm once a month, and take away a proper quantity of blood to supply the place of the menstrual evacuation, and prevent those ill effects which proceed from a long obstruction and generally at last prove mortal" [27].

The last of the old school I shall allude to is Dr. John Burns (and I am the more persuaded by his opinions than the time in which he lived, to put him among the ancients—to his advantage). In his book he says: "Menstruation has been attributed to the influence of the moon, to the operation of a ferment in the blood or in the uterus, to the agency of a general or local plethora, or to the existence of a secretory action in the uterus. The last of these is the most probable opinion" [9].

We notice, then, that a definite idea existed as to the toxæmia produced by suppressed menstruation, and to the active participation of the uterus in a secretory process. In fact, we may summarize the opinion of the older authorities in regard to menstruation: that an excretion was believed to take place of some body from the blood, which body was capable of producing toxic effects if retained in excess—a view, in my opinion, not far from the truth.

It is now necessary to mention, just very briefly, the trend of modern opinion as set forth by many authorities, who, while they must have known and observed the same facts as the writers of previous ages, seem to have been content to regard the menstrual function as an almost entirely local process—or at any rate as much so as the cutting of a tooth, for, of course, any vital process must to a certain extent be general in its relationship to the organism. The well-known ovulation theory which held the field so long and so exclusively, and by which the rupture of a Graafian follicle was supposed to be the cause of the onset of the bleeding, has now been finally exploded. Ritchie [26], in 1843, was the first to attack this theory—somewhat unsuccessfully. In 1884 Lawson Tait [31] wrote a characteristic paper, in which he gave the results of his own observations during operations on living women, in a large number of whom he found no corpus luteum in the ovaries at the commencement of menstruation. Nevertheless, this theory, so entirely local in its significance, was not finally and completely laid low until the recent researches of Heape [13] and Marshall [20] on the "heat" or "rut" of animals. So long as menstruation was held to be a function of women only, and so long as the "rut" of animals was not considered to be homologous, there was little chance of the questions in dispute being definitely settled, and in this connexion it is interesting to note that Lawson Tait [31] and others strenuously opposed the idea of any homology.

It is now generally agreed, however, that the recent work of Heape [14] has placed beyond a doubt the fact that the pro-œstrum stage of the "rut" of animals is homologous with menstruation, and that ovulation is not the controlling factor. In view of this blow at the essentially local theory of menstruation, it is not surprising that one hears little now of the "cyclical nerve storm" or other "nervous connexion" theories which once obtained [24] [30] [32].

I do not think that in the present day I need seriously consider those other theories of menstruation, also dependent on the ovulation theory, which were, too, so local in their application, namely, that the function of the phenomenon was to "freshen" the internal surface of the uterus for the reception of the fertilized ovum [12] or the reverse [28], albeit they obtained wide acceptance at one time, and that not so long ago.

Although the existence of menstruation has always been commonly considered to be an indication of the child-bearing possibilities of the female, we now know that there is not that close relationship to what

I may, perhaps, term the major function that was ascribed to it by some of the older writers. In fact, there is ample evidence to show that conception can and does take place in the absence of the catamenia: in girls and women before the function has commenced [2]; during lactation and the actual fertile sexual life;[1] and recent authorities have observed cases of conception occurring after the menopause [1] [2] [4].

However frequently menstruation may be a concomitant of fertility, it cannot therefore be considered to be a causal or controlling factor in that desirable potentiality. Nevertheless it is only fair to say that Marshall and Jolly [21] and many modern authorities still appear to think otherwise.

While the more recent experimental work has been very destructive in regard to the older views, and fruitful in the collection of facts of considerable importance, it appears to me that there has been too much limitation in the area of observation for the attainment of sufficiently ultimate conclusions in regard to the function under investigation. The removal of uteri and ovaries and the histological examination of these organs tell us much, but not all.

Looking upon the facts, theories, and assertions which have been handed down from the remotest past, and even after a due consideration of the most recent work, one was bound to admit, in the words of Mr. Bland-Sutton, "concerning the cause, significance, and utility of menstruation we know nothing," and "the cause of menstruation remains as obscure as ever" [8]. When, therefore, I could find no school of thought which presented a doctrine at all in harmony with all the known facts, I decided to strike out a fresh line in the matter, keeping an open mind as to the ultimate conclusions and making free use of the facts observed by others.

Morphological and evolutionary considerations, which have so often come to the rescue before, first came under notice, and while there is no direct descent to be traced, as far as I know at present, in regard to my views, it occurred to me that probably the mammalian genital apparatus might in some way bear comparison with that of our somewhat remote egg-bearing ancestors. At least it seemed probable that those physiological functions which play such a large part in the production of eggs should show some trace of existence in the latest evolutionary model.

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[1] For instance, a case under my own care: Mrs. P., aged 43. Catamenia commenced at the age of 14. Married when aged 19. Twelve children, no miscarriages. Did not menstruate during first twenty-three years of married life, during which time she had eleven children. Previously and subsequently, except throughout the pregnancy and lactation of her last child, she was regular.

By means of the method of calcium estimation in the blood which I devised and described some time ago [5] I have been able to demonstrate, to my own satisfaction at any rate, that the idea of the connexion between the calcium metabolism and female genital activity is not entirely unfounded. Indeed, I claim that the metabolic processes concerning the calcium economy exercise an all-important influence upon the genital functions, and are necessary factors therein.

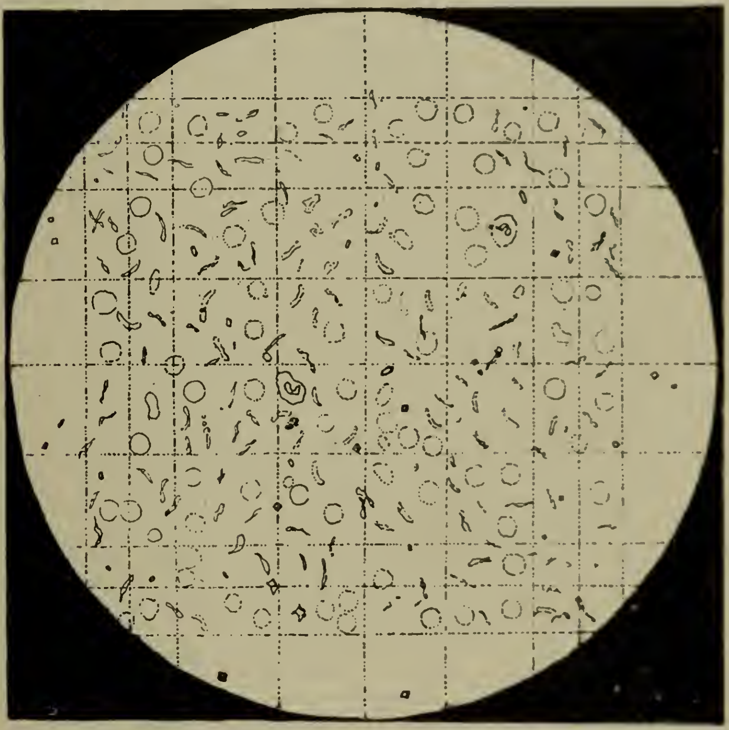

FIG. 1.

Normal blood calcium content. (× 420.)

In order to make some of the later illustrations the more intelligible I will show you a picture (fig. 1) of what normal blood looks like when prepared, by the method mentioned, for the estimation of calcium. The calcium is seen precipitated in the form of crystals of calcium oxalate. These are counted on a hæmocytometer plate, an average of one crystal per square being the normal maximum index of 1.

With a view to ascertain what effect upon the systemic blood of birds the process of egg-laying had, I took three hens and examined the systemic blood of each bird daily for a week. I filled in the facts regarding the eggs laid afterwards from information kept and supplied to me by those in charge of the birds. I arranged that one hen should be a non-layer for a control. The following charts (fig. 2) illustrate the results obtained. From these it will be seen that the first, or control, hen showed practically no changes in the calcium index from day to day. The second hen, laying every other day, showed a marked drop after laying an egg, with a big rise the

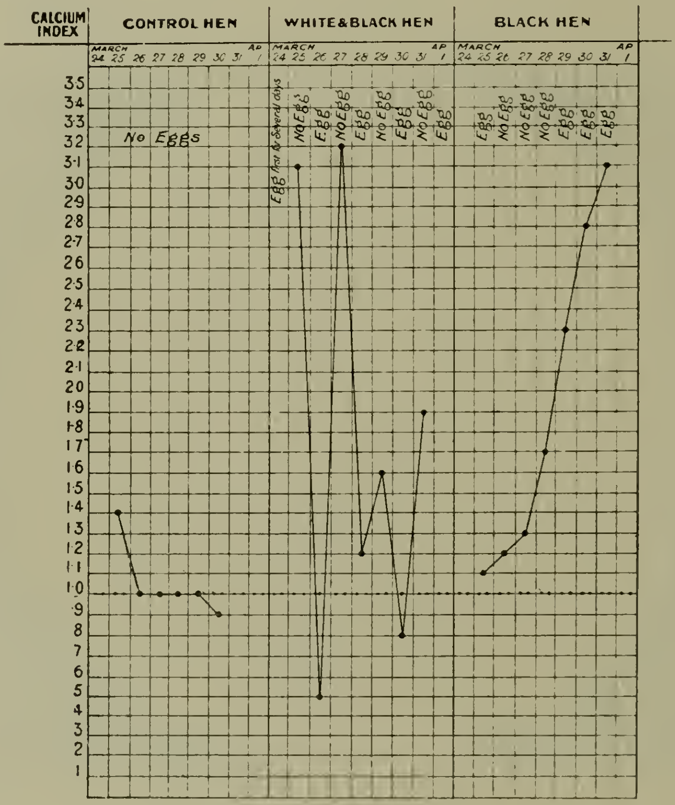

Fig. 2.

Systemic blood of hens—calcium indices.

next day in preparation for the laying of an egg on the alternate day. The third hen was very interesting. An egg was laid on the first day, and the index was low; this index remained low for several days, and consequently no egg was laid, but finally it got up and remained so high that an egg was laid on every day during the rest of the observation. The index may have dropped for a short time after the laying of the egg, but the fall was of such short duration that it was not observed, a rapid rise, or maintained high index, being necessary for daily egg-laying. I should like to hazard the suggestion here that the well-known vaso-dilatation which occurs in the combs and wattles of laying hens is due to the drop in the calcium content of the blood, whereby a sort of chilblain condition is produced. I think that these experiments, performed in duplicate, are very important, and I must say that the result was only what one would be reasonably led to expect if one considered the matter at all.

I will now deal with some facts and experiments which are of themselves just as convincing in regard to animals and the human subject. When one had got the idea regarding the existence of some connexion between the calcium metabolism and the female genital organs, it, of course, struck one how easy it was to explain on this theory the fact that menstruation is nearly always in abeyance during lactation, for we know what an important and physiologically predominant ingredient of milk calcium is. It was easy to understand, too, why menstruation should frequently be absent in the debilitated, since I had already observed the important part the calcium salts play in the repair of diseased structures [6], and why, as Ambrose Parey [22], in the quotation given, emphasized, and I, too, have done [5], this function only commences when the economy has lime salts to spare from the constructive claims of the body.

To come to the actual observations on women. First in regard to the systemic blood. There is always a very marked drop in the calcium content just before the menstrual bleeding commences. Often this drop is preceded by a marked rise (compare reference [7]). The following chart illustrates both these points (fig. 3). It is the chart of a girl who is subject to hæmatemesis at each menstrual period—a true case of coincident vicarious hæmorrhage. We had her in hospital some time for observation.

The next chart (fig. 4) illustrates the systemic blood content in another class of case. The patient was suffering from minor hystero-epilepsy, due to calcium deficiency, and was completely cured by the judicious administration of calcium lactate. Her premenstrual index was low. With the onset of bleeding, which only lasted for twenty-four hours, there was a marked drop. You will see that though not so apparent as in the last case it is almost as great relatively, in that the content dropped to one-sixth of the previous amount.

It is not easy to obtain the chart of an absolutely normal menstrual cycle. I hardly remember seeing a woman who was without a single symptom at this period, but I show you in the third chart (fig. 5) what I consider to be as normal a chart as it is possible to obtain from the human subject. As I have pointed out elsewhere, it is important that the blood should be taken for the estimation of calcium at the same time each day [6].

There is, then, a marked drop in the systemic blood calcium content of the human subject, which is most marked just before the bleeding occurs. In the same way the formation of an egg leads to a depletion in the systemic blood of birds, and in considering this one was next led to examine the excretion of the uterus during menstruation.

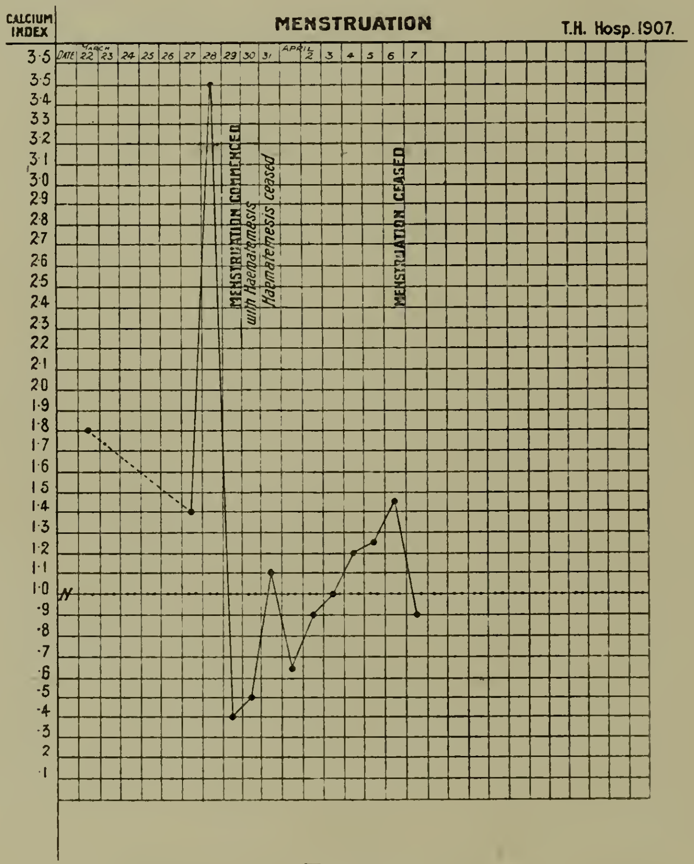

FIG. 3.

Systemic blood—calcium indices during vicarious menstruation.

At the very commencement of menstruation the discharge is largely composed of leucocytes, and this local leucocytosis, which usually precedes the actual bleeding, is extremely interesting, for an examination of the discharge at this period by the method for calcium estimation mentioned shows that there are not only a large number of free crystals but also a far larger number precipitated within the

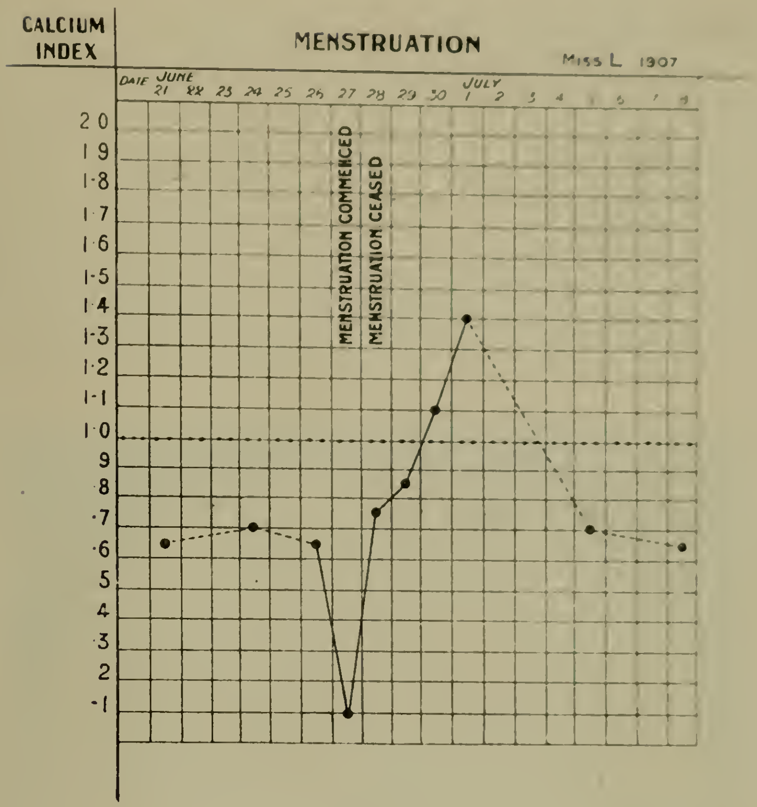

FIG. 4.

Systemic blood—calcium indices during menstruation with hystero-epilepsy.

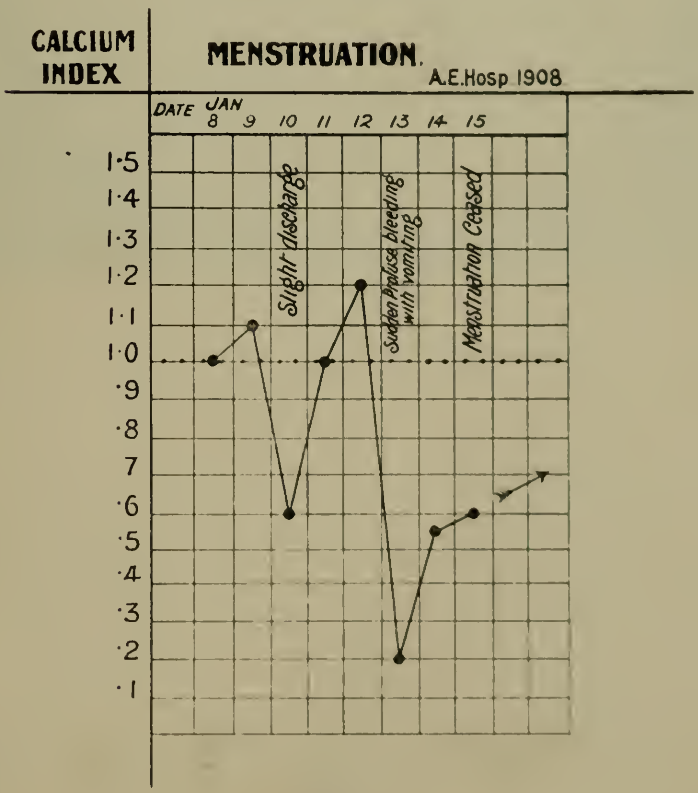

FIG. 5.

Systemic blood—calcium indices during normal menstruation white corpuscles themselves (*see* fig. 6). This was so surprising to me that I should have hesitated to give credence to what I saw —or thought I saw—or to have drawn deductions therefrom, had not other more authoritative observers than myself kindly examined my specimens and agreed with me. Professor J. E. S. Moore informs me that in some of the lower forms of life excretion is carried out by means of leucocytes, which may come to the surface and be thrown out, or even go back after discharging their contents.

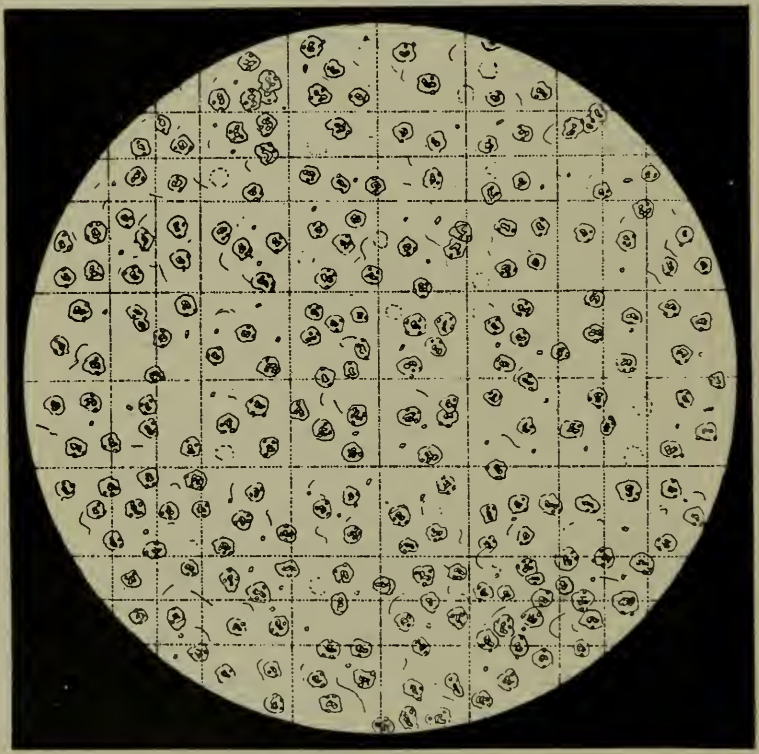

FIG. 6.

Menstrual discharge, first day. (× 420.)

Now this is probably an instance of what has been called pinocytosis [11]. I have to thank Dr. R. J. M. Buchanan for calling my attention to this subject, which he did after I had stated elsewhere [6] that I believed that the leucocytes absorbed the calcium in a fluid form and carried it from the glands to the exterior, possibly preventing a free secretion of calcium compounds, which might cause the blood to clot *in utero.* I shall allude to this point again in a moment.

An examination for calcium salts in the menstrual discharge at a later period (third to fourth day) shows that there is still a marked excess as compared with the systemic blood, but the discharge is then sanguineous and contains the usual epithelial cells, with but few leucocytes, and it shows marked tendency to clot (*see* fig. 7). Thus it will be seen that there is an excretion of calcium coincident with the fall in the blood of the calcium content.

To prove these views further I tied the uterine horns of rabbits and examined the contents. I found that the fluid collected was exceedingly rich in calcium—more so in the adult menstruating rabbit than in the virgin rabbit. In fig. 8 is seen the fluid collected from a young non-menstruating virgin rabbit. Here one finds the calcium combined or mixed with mucin, with which it is precipitated. In the older menstruating rabbit it exists in larger quantity, free, as well as with mucin and leucocytes, as is seen in fig. 9.

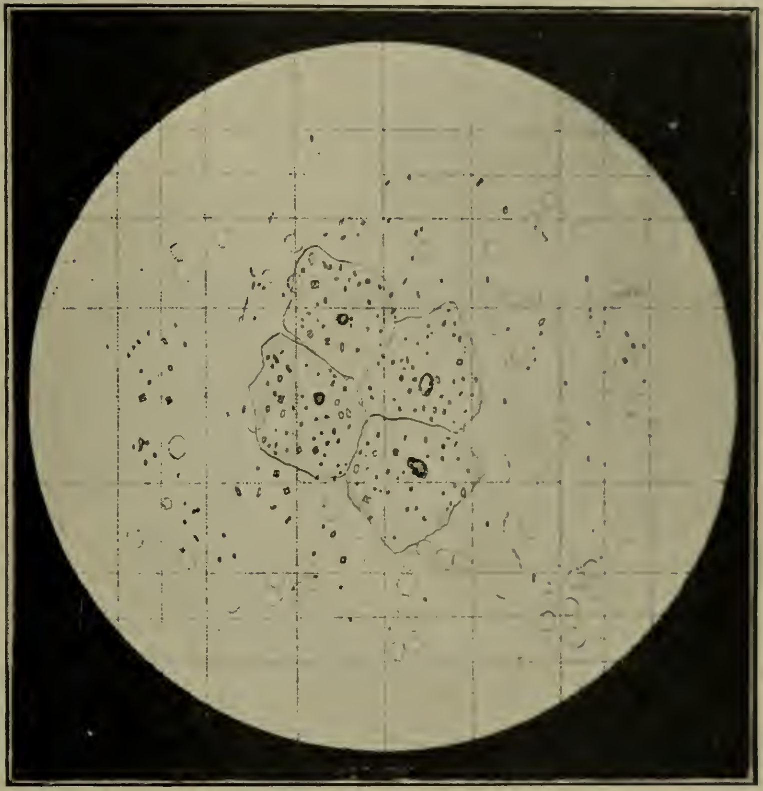

FIG. 7.

Menstrual discharge, third day. (× 420.)

To complete the chain of evidence the menstruating uteri of women and rabbits were next examined histologically. I found, as others have done, that there is a marked activity in the glands at this time, with a diapedesis of leucocytes in the neighbourhood. In fig. 10 is seen a section of the menstruating rabbit's uterus under a low power. In fig. 11 a gland from the same section is shown under a high power. It is a gland in a state of activity. Leucocytes are seen outside the gland, in the process of making their way between the gland epithelium. [To this I would call your special attention. You will notice that they become elongated and flattened. They were recently observed and figured by Marshall and Jolly [21] in this condition, but these observers concluded that these elongated cells were merely gland epithelial cells in an actively secreting condition.] And lastly you will observe the collection of leucocytes within the gland lumen, embedded in the secretion of the gland. I believe that they then carry some calcium compound with them to the exterior. I would add that apparently the columnar epithelium that lines the interior of the uterus plays the same part as that lining the glands —which are formed by a process of invagination from the surface.

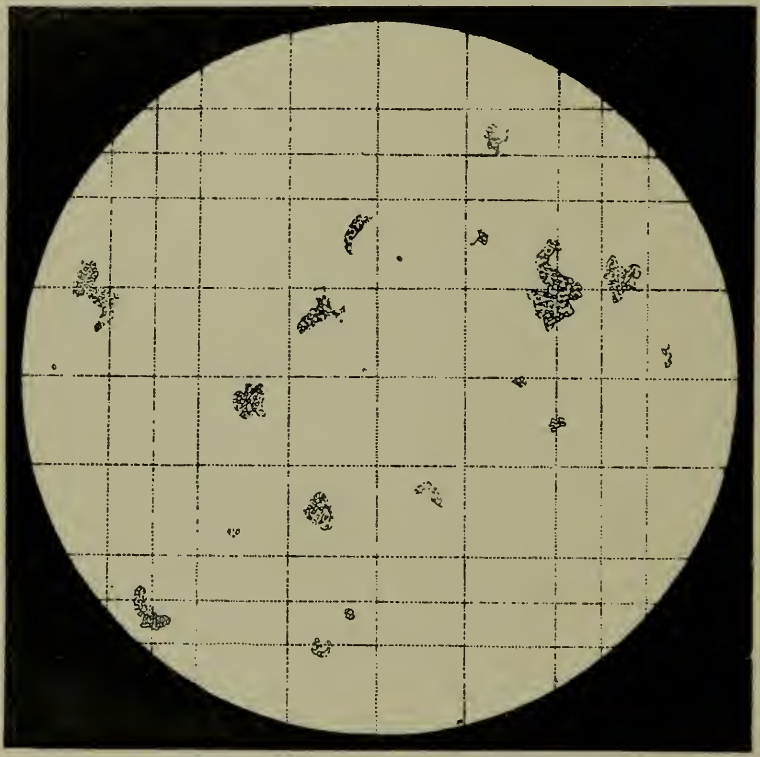

FIG. 8.

Fluid from artificial hydrometra of young virgin rabbit. (× 420.)

In fig. 12 the same thing is seen happening in a gland from a menstruating woman's uterus.

I have not time here to discuss the other points of histological interest, for they are many and somewhat controversial; but I cannot pass on without giving you the final tale of the hens which had already served me so well. In fig. 13 is seen a section (low power) of the calcium secreting chamber of a non-laying ("sitting") hen. In marked contrast with this is a section under the same power—shown in fig. 14—of the calcium secreting chamber of a laying hen. In the

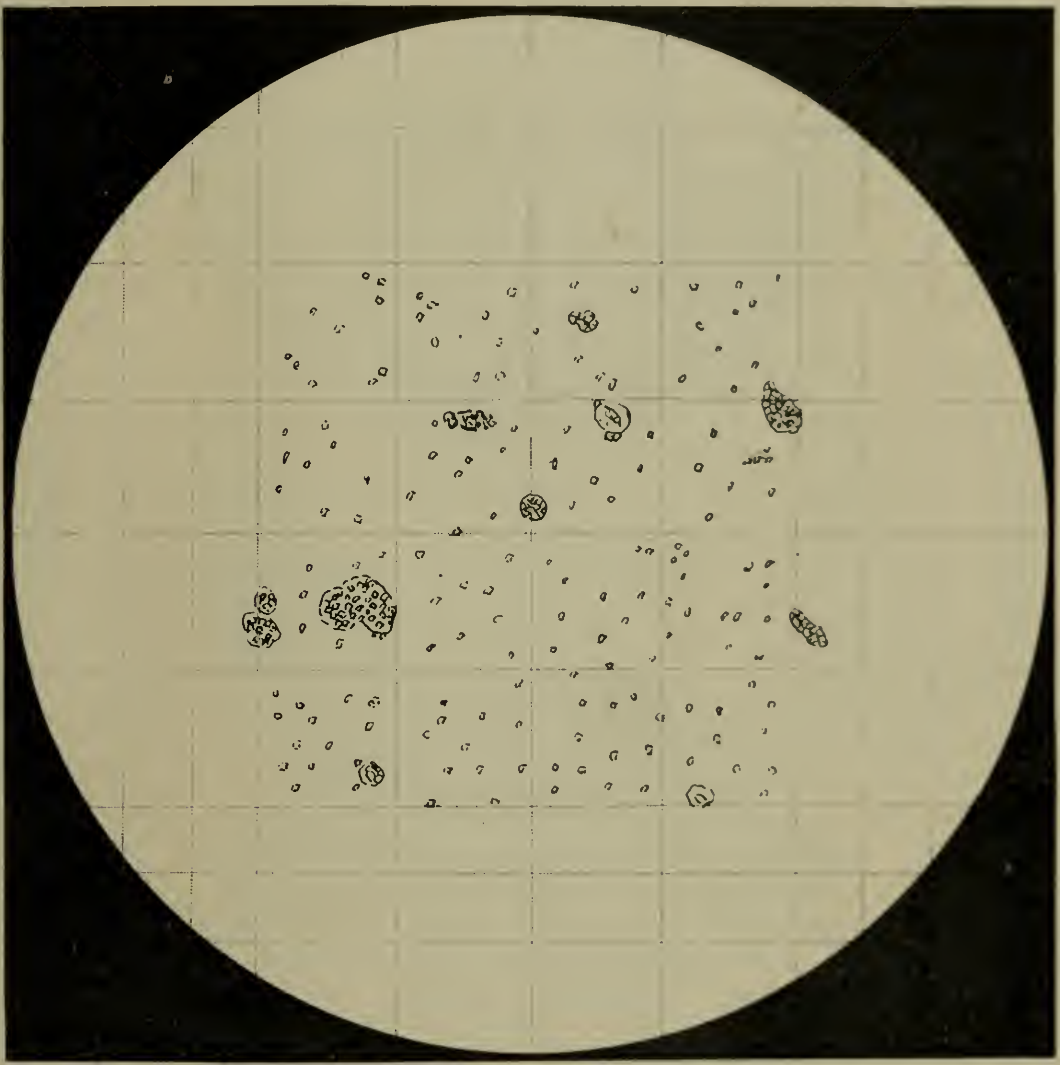

FIG. 9.

Fluid from hydrometra of menstruating rabbit. (× 420.)

(This plate should have been reduced to the size of preceding figures.)

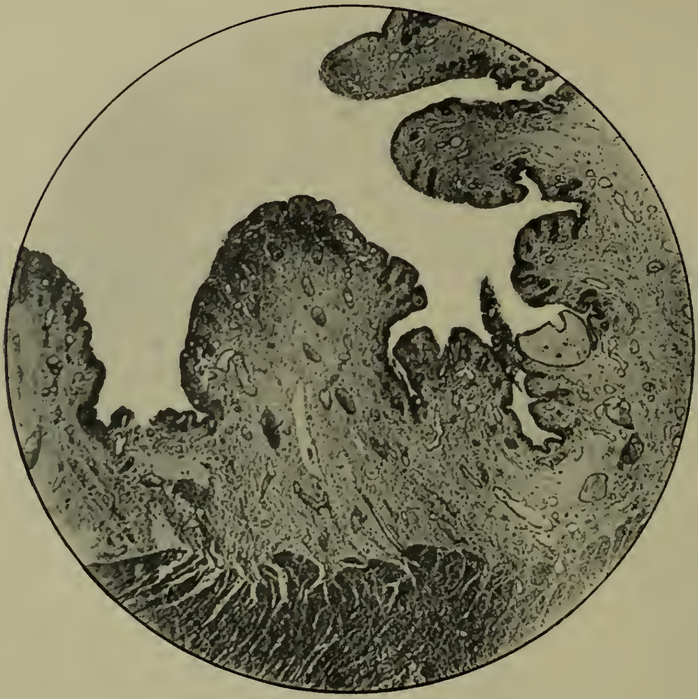

Fig. 10.

Menstruating rabbit's uterus. (× 250.)

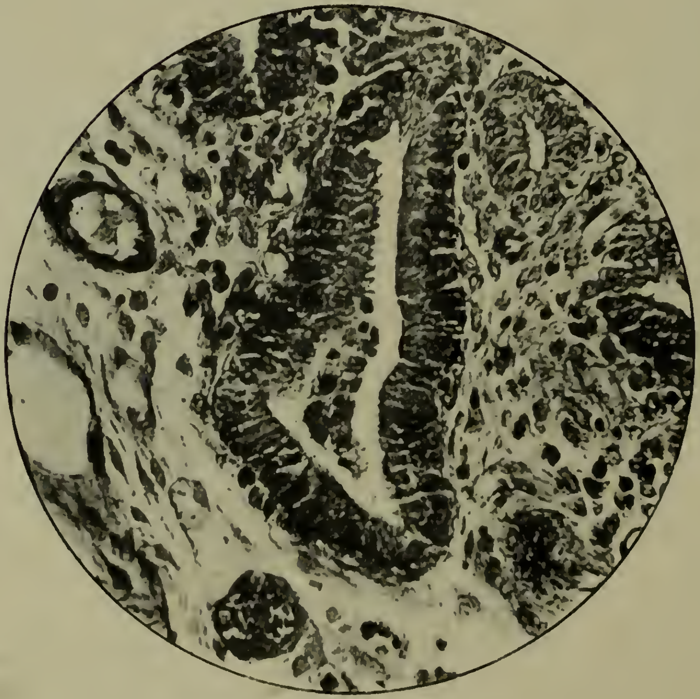

Fig. 11.

Menstruating rabbit's uterus, showing glandular activity. (× 1,200.)

former the rugæ are small, and the stroma underlying the epithelial layer full of cells which have hardly any definite glandular formation, as is seen in fig. 15. In the latter (fig 14) from the laying hen, the rugæ are large and there is a great regularity of actively secreting glands, as will be seen in the high-power sections (figs. 16, 17 and 18).

In fig. 16 there are two points of interest to which I attach some comparative importance. At one spot is seen a rupture in the continuity of the epithelial surface, such as can be seen in one place in the menstruating rabbit's uterus (fig. 10), and directly opposite this is seen the secretion collected and infiltrated with leucocytes outside the mouth of a gland—a condition frequently seen in the menstruating uteri of women and rabbits, and I suppose in other mammals.

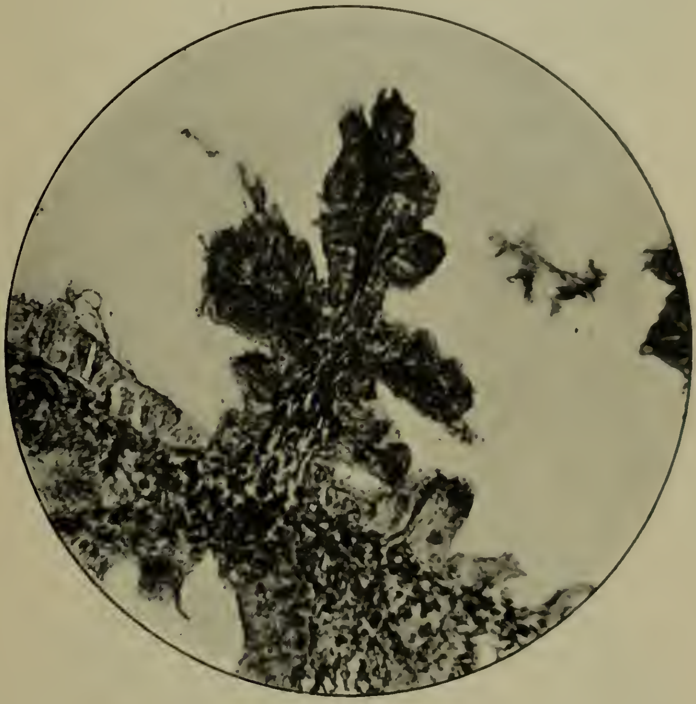

Fig. 12.

Menstruating woman's uterus, showing glandular activity. (× 1,200.)

Fig. 17 shows an invagination forming a superficial gland in the calcium chamber, through the epithelial cells of which leucocytes may be seen passing. Fig. 18 illustrates the vascularity and diapedesis which are seen in these rugæ when actively engaged. Figs. 16 and 18 were taken from a hen while an egg was in the process of being coated with lime salts.

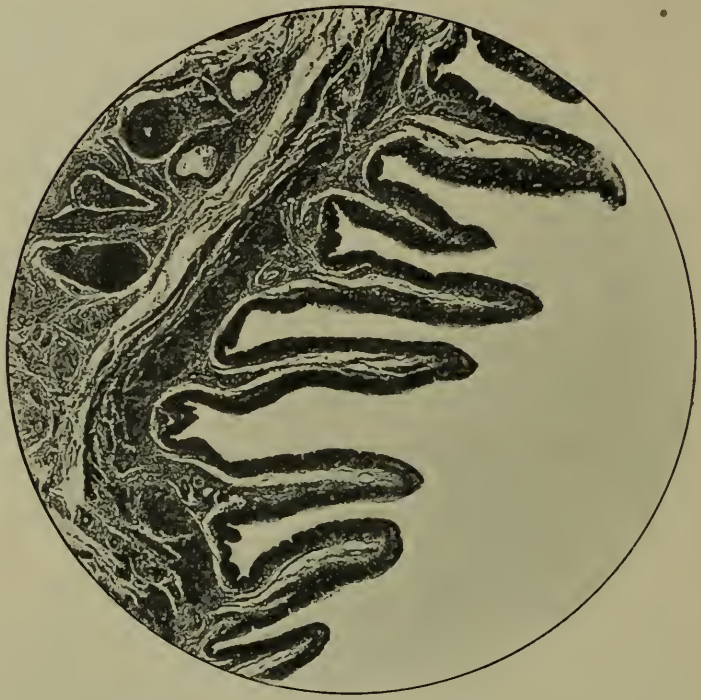

Fig. 13.

Calcium secreting chamber of a non-laying hen. (× 250.)

Fig. 14.

Calcium secreting chamber of laying hen. (× 250.)

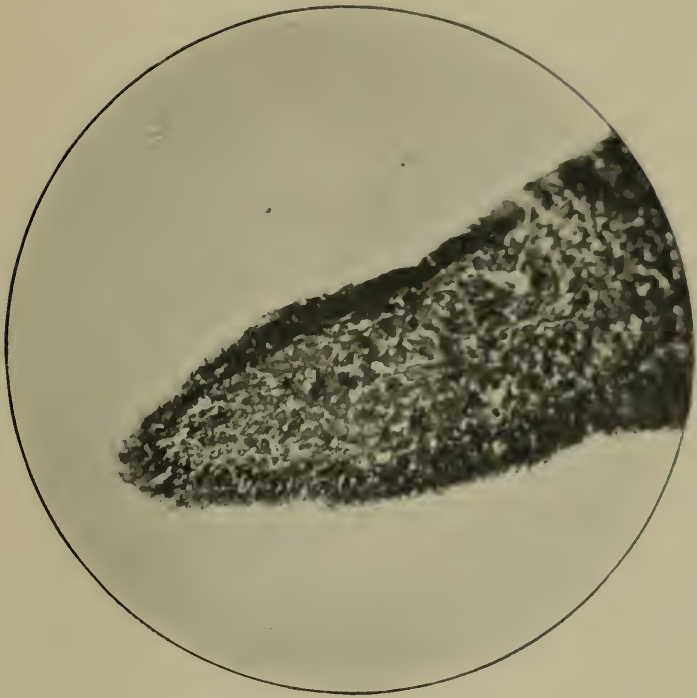

FIG. 15.

Tip of a ruga from calcium chamber of non-laying hen. (× 1,200.)

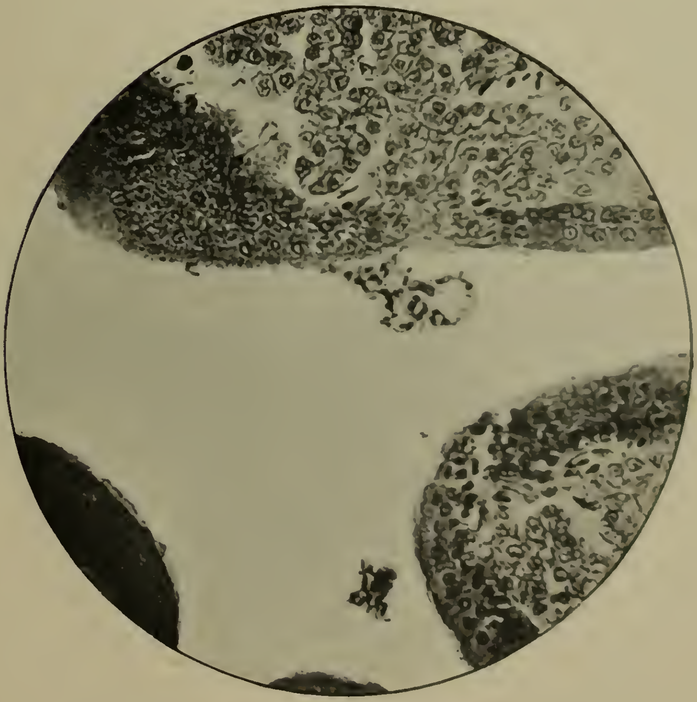

FIG. 16.

Calcium secreting chamber of laying hen. (× 1,200.)

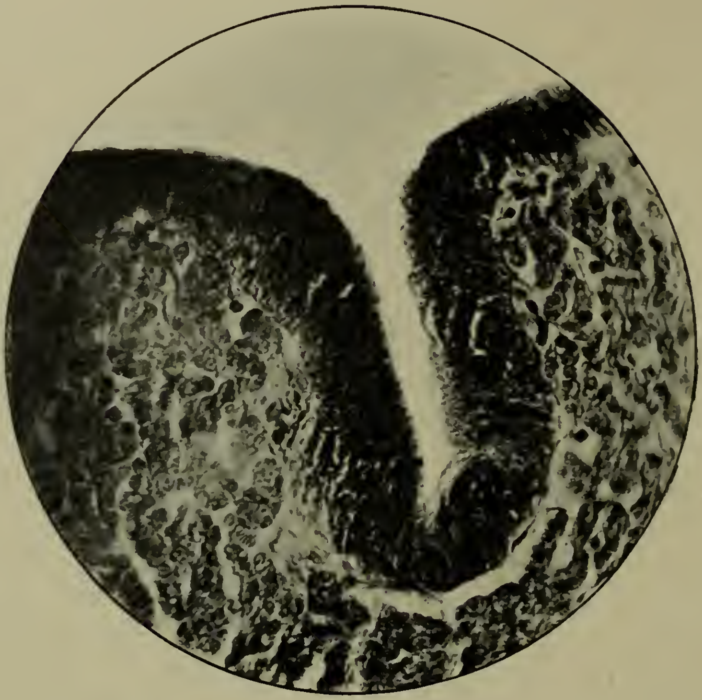

Fig. 17.

Superficial gland in calcium chamber of laying hen. (× 1,200.)

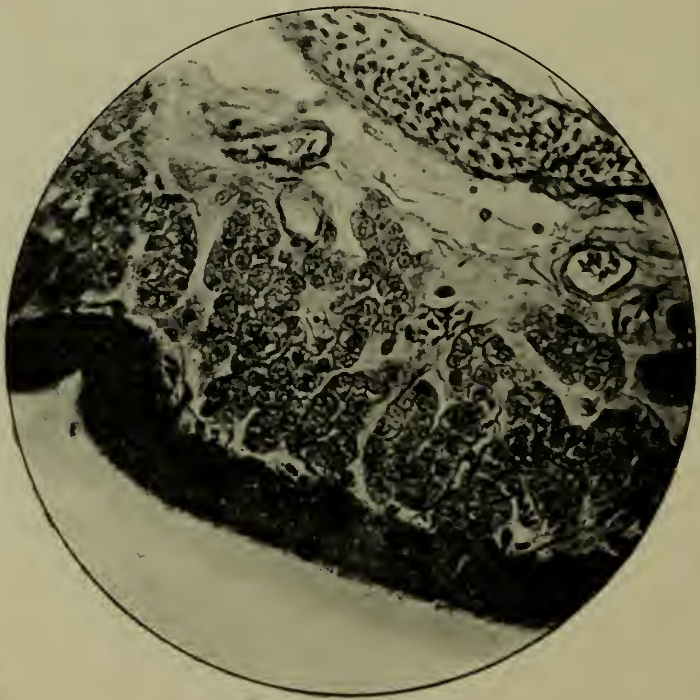

Fig. 18.

Vascularity and diapedesis in calcium chamber of laying hen. (× 1,200.)

Now, since it has recently been established by Heape [14] and others that the pro-œstrum stage of "rut" in animals is really analogous to the human menstruation, these facts are of considerable importance, and I think sufficiently demonstrate the cause and effect I wish to emphasize. There are, however, a few other points which must be considered in order to get on to *terra firma*, and into a region from which we can glean facts of importance from a clinical point of view. I mean, of course, how does all this come about? What are the ulterior forces at work? I can imagine that many are already wondering how I shall attempt to explain the periodicity of menstruation and the many other almost supernatural concomitants which seek to shield the mystery of woman from us and keep up our interest in her intricate genital machinery, the reflection of which, in her inscrutable mind, has so long been a source of interest to the greatest philosophers of all times, from Plato to Weininger.

If I may be superficially philosophical for a moment, I would ask you to consider what periodicity is, and what it means. It simply means the influence of certain circumstances upon a certain environment. If the circumstances and the environment are always the same, periodicity must exist, if we accept the fundamental principle of perpetual energy. There must always be in life anabolic and katabolic factors. It is only when we cannot explain a thing that we wonder at the astonishing complexity of the mechanism that governs it. And when the ancients thought the moon governed the menstrual discharge they were far nearer the truth, in principle at any rate, than many would believe. I can imagine some of the old philosophers with Delphian ambiguity announcing this doctrine to their disciples, all the while knowing themselves that what they really meant was that the periodicity of the catamenia is to the lunar changes as are the lunar changes to universal periodicity—to the perpetual anabolic and katabolic changes which make for the absence of negativeness.

I suppose we have ceased to wonder at the rhythm of respiration or of cardiac contraction. Any second year's student can explain the former in satisfactory terms, and I suppose it is not any more difficult to explain the cardiac rhythm after the splendid work done by Sidney Ringer. We can, in reference to cardiac rhythm, substitute lime and other salts for the oxygen and carbonic acid gas concerned in respiration.

The periodicity of the menstrual function, of the "rut" and breeding in animals, is exactly on the same lines—merely a question of whether or not certain necessary articles (among them calcium) are at the disposal of the organs concerned for excretion at certain times. To some extent Stevenson [29] argued on the same lines in discussing his "menstrual wave" theory in very general terms. This periodicity has really no immutable law of a fixed time, as one might be led to think by the way some authorities have written of it. It is subject to many influences, for the individual has first claim upon all ingredients necessary for herself before she has any to spare for excretion—that is, for supplying a fresh individual (her embryo) or for menstruation. These influences, apart from pregnancy,[1] are seasonal and climatic, dietetic and hygienic. How important they are can be gauged by the effect evolution has had, or even by the effect domestication has upon the habits of wild animals and civilization upon the human race. The periodicity of the catamenia is, then, no supernatural affair; it is merely the result of a concomitant series of metabolic processes, such as are seen in other spheres of physiological activity, which may or may not allow of regular menstruation. I do not think I need go further into this point. It seems to me to be very obvious, and if viewed in this light makes strong argument for my ideas concerning the influence of the calcium salts.

If, then, the calcium metabolism is of such primary importance, it is surely worth while, from a clinical point of view, interesting ourselves in this metabolism. I have already had the general calcium metabolism under consideration for this reason, and I will briefly recapitulate some of the facts which seem to have a bearing upon menstruation. One is led to the conclusion that the calcium metabolism is largely influenced by the secretion of the ductless glands. As far as I can say at present it appears that the ovaries—whose effect upon osteomalacia is well known—the adrenals—the extract of which has been used with success in osteomalacia—the pituitary—so often diseased coincidentally with bony enlargements—the thyroid, and perhaps the thymus, all play an important part in the metabolism of lime salts.

With regard to the pituitary extract I may, perhaps, be allowed to say a word or two, for not much is at present known about it. I have been much interested in the extract prepared from the infundibular portion of the gland, which not only probably influences the calcium index in the blood but also has a powerful influence in causing violent uterine contractions, an account of which I shall publish later along with other work upon the same lines. This action has also been noted by Mr. H. H. Dale. The influence of this gland upon menstruation is also marked, for it has been shown that tumours of, and in the neighbourhood of, the pituitary gland cause amenorrhœa, and that cessation of the menses is one of the earliest symptoms of acromegaly [3]. It has also been shown that sexual infantilism, with an absence of menstruation, is a general complication in early disease of the pituitary gland [10]. An analysis of about 150 cases of acromegaly recently made confirmed the above statement regarding amenorrhœa, and also that lactation hastens the progress of the disease [23].

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[1] The interesting fact, which has been overlooked or underestimated by most students of menstrual periodicity, of repeated œstrus (every fortnight in rabbits) in unimpregnated animals is surely comparable to the monthly menstruation of non-pregnant women. That this condition is not more frequently observed in animals is due to the promptness with which impregnation usually occurs.

The thyroid gland, on which I have done some work [6], undoubtedly has an influence upon the calcium metabolism, especially in regard to the excretion and upon menstruation, as is evidenced by the enlargement of this organ, frequently seen during the commencement of this function. I regret that time will not allow me to dwell on this interesting subject, nor to bring to your notice the clinical observations based on treatment founded upon this influence of the ductless glands upon the calcium metabolism. Perhaps it is as well, for enough work has not yet been done to allow of authoritative statements.

The main conclusions I have come to are:—

(1) That menstruation is a periodic function only in so far as the rest of calcium metabolism is in harmony with this periodicity, and that the function is dependent upon the calcium metabolism in all its ramifications.

(2) That the hæmorrhage into the Graafian follicle may be coincidental and is the result of the lowered calcium content of the blood, but that it is in no way responsible for menstruation.

(3) That the bleeding from the uterus, while due to the lowered calcium content of the blood in the main, is also dependent on the local change in the capillaries from which the diapedesis of leucocytes and corpuscles occurs, and, further, that these leucocytes are an active factor in the conveyance of calcium salts from the glands to the exterior.

(4) That the uterine glands excrete calcium and mucin, and that therefore the uterus is a "menstrual organ" [19].

(5) That there is a correlation between the ovaries and uterus in reference to menstruation, but that the ovary is probably no more predominant than other ductless glands in this respect.

(6) That menstruation *per se* is not a necessary adjuvant or concomitant to fertility and reproduction.

I would ask your serious consideration of these conclusions, which are based upon prolonged experimental work and clinical observation, and which fit in so well with the physiological facts that are known to us. It is, indeed, in this harmony and concordance that at once the strength of my views lies and the suspicion with which they will doubtless be received rests. If I have put the matter forward sketchily, and without a proper sense of proportion, it is out of consideration to those whom I have the honour of addressing; for a string of scientific facts, like the unrelieved amenorrhœa alluded to by Dr. Peter Shaw, is apt to become "mortal" in its effects upon any audience, however learned or well disposed.

I have, finally, to express my indebtedness to Dr. Pantland Hick, who has given me much valuable assistance in the experimental work, and to the Scientific Committee of the British Medical Association for money grants.

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DISCUSSION.

Dr. Pollock said that he did not think the hen was the best animal with which to make the investigations, as a hen must of necessity contain a good deal of calcium when laying an egg in order to form the shell. He thought a mouse or guinea-pig would have been more suitable.

Dr. Amand Routh thought that the author had brought forward a large number of facts which collectively went far to prove the reliability of the views expounded by him. The lowering in the amount of lime in the blood which immediately preceded menstruation was extremely interesting. So also was the fact that lime salts began to re-accumulate in the blood as menstruation ceased, but he did not think that the author had proved that this coincidence was functionally causative of menstruation. Like Dr. Pollock, he thought the author's choice of a hen for his experiments was not a good one, and he could not see the force of the charts showing the variation of the lime in the blood of the hen which laid eggs on alternate days, for the lime for any particular egg was required not on the day before it was laid but several days before, and many eggs were in process of development all the time. The paper was one to study and think over in order to appreciate its full significance.

Dr. BECKETT-OVERY said he had had his attention drawn to Dr. Blair Bell's work by Dr. Curtis Webb, and had made a few estimations of calcium in the blood in the way suggested. So far as he had gone the results obtained were in accordance with those obtained by Dr. Blair Bell, and he had found no difficulty in counting the crystals.

A Case of Placenta prævia with Delivery of Complete Gestation Sac at the Twenty-eighth Week.

By THOMAS J. T. MCHATTIE, M.B.

THE specimen, which shows a twenty-eight weeks fœtus with placenta and membranes intact, was delivered on April 5 last. The placenta is of the membranous variety, being unusually thin and covering, in its extent, half of the entire ovum. Through the membranes the fœtus can be felt and seen in outline, the breech being in relation to that part of the placenta which in the recent state occupied the lower uterine segment.

History.—The patient, aged 27, is a multipara, this being her third confinement. Menstruation began at the age of 17, has always been regular, of the twenty-eight days type, lasting usually four days. Her last period extended from September 28 to October 1. Of her previous labours the first was normal, but in the second, which occurred three years ago, there is a history of severe ante-partum hæmorrhage, due probably to placenta prævia. During her recent pregnancy she had had repeated attacks of hæmorrhage more or less severe.

On April 5 I saw her at about 1 o'clock p.m. She was then losing slightly, but had no pains. The uterus corresponded in size to that of a six and a half months pregnancy. The abdominal wall being very thin and lax, the fœtal parts were easily distinguished, the head being felt at the fundus. Fœtal movements were present, but I was unable to detect the heart sounds. The cervix was partially dilated and a breech presentation was clearly made out, though placental tissue could not be definitely distinguished, owing probably to the thinness of that organ. As the hæmorrhage was very slight the patient was placed in bed and an opiate given in the hope of prolonging the pregnancy. At 5 o'clock in the afternoon, however, I was sent for and found that labour had set in shortly after my first visit and that the ovum had already been expelled *en masse* and without rupture of the membranes. There had been comparatively little hæmorrhage, the uterus was well contracted, and the patient made a good recovery.

DISCUSSION.

The PRESIDENT (Dr. Herbert Spencer) asked if the dates at which the hæmorrhages had occurred were known. In investigating the histories of cases of placenta prævia at University College Hospital he had found that the first hæmorrhage occurred about as frequently in the first six months as it did in the last three months of pregnancy.

Dr. AMAND ROUTH thought that the diffuseness of the placenta and its great relative area showed that the specimen was one of that variety of placenta prævia which was the result of atrophy of the chorionic villi at the attached pole and development of the chorionic villi at the free pole.

Dr. MCHATTIE, in reply to the President, regretted that he had not ascertained the exact dates on which the various hæmorrhages had taken place during the recent pregnancy. There had been at least three of these attacks, and he was almost sure that the first had occurred within the first three months: it had certainly taken place before the end of the fourth month.

Pregnancy complicated by a Fibroid Tumour showing "Red Degeneration."

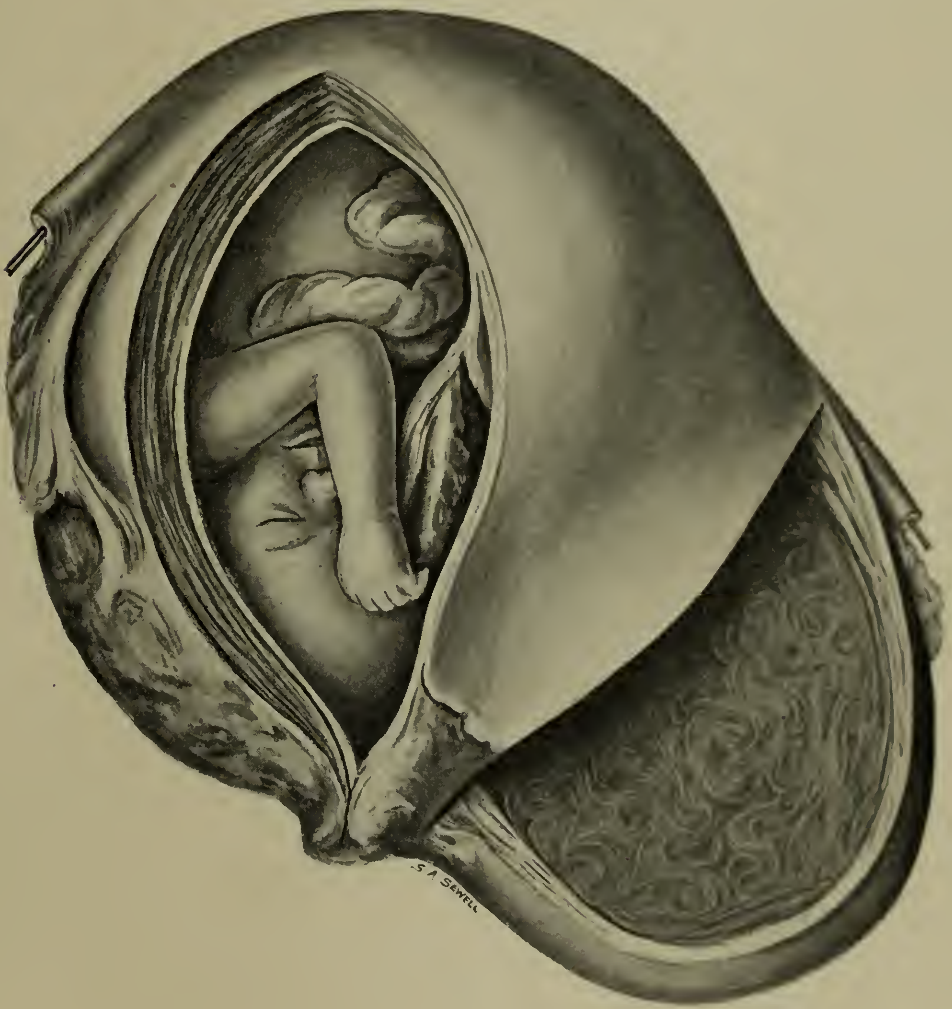
By FREDERICK J. MCCANN, M.D.

THE treatment of fibroids complicating pregnancy is a subject which is engaging attention both at home and abroad, and lately a number of papers have been written on this important question, showing that there still is considerable diversity of opinion among those who are called upon to advise what should be the best course to pursue. The difficulty of deciding is well exemplified by the following illustration.

I was asked to see a woman, aged 25, on account of severe pain in the left side of the abdomen. She was very anæmic, fairly well nourished, and had been married nine months. The pain had persisted for five days before she consulted her own medical attendant, and was more or less continuous in character. It was partially relieved by rest, fomentations, and morphia. When I saw her she told me that her menstruation had ceased for four and a half months and that it had been previously regular, except for an attack of bleeding lasting fourteen days, which had occurred two months prior to the menstrual cessation. This bleeding was considered to be due to a miscarriage. The amount of blood loss at the periods had not increased during the previous two or three years, and no increase in the size of her abdomen was noted before the occurrence of pregnancy. Except for slight morning vomiting she had been fairly comfortable until the attack of pain commenced.

When her abdomen was examined a large central elastic movable swelling was felt rising out of the pelvis and reaching to the level of the umbilicus. It was painful on pressure on the left side. Bimanually the cervix was found to be high up, difficult to reach, and pushed over to the right by a large, rounded, firm, elastic swelling, continuous with that felt by abdominal examination. Owing to the difference in consistence between the softened uterus and the harder tumour it was not difficult to map out its boundaries. The tumour burrowed into the broad ligament on the left side and occupied the pelvic inlet. It appeared to be very tender on pressure or on any attempt being made to move it. The patient looked ill, and her doctor informed me that her temperature had been 100° F. to 101° F., accompanied by increased pulse-rate. A diagnosis of fibroid complicating pregnancy at four and a half months was made, and the question of treatment was then considered.

I advised operation after full consideration of all the circumstances, and informed her friends that if possible I should remove the tumour only, but that I must have a free hand to do what I considered advisable at the operation. To this they assented, and five days later, as the pain continued, I operated at the Samaritan Hospital. The tumour was found to be a fibroid growing from the lower uterine segment and burrowing into the left broad ligament. It was firmly impacted in the pelvis, like a cork in a bottle. Myomectomy was not attempted because of the position of the tumour, its relation to the cervix and lower uterine segment, the risk of abortion, and because an attempt which failed would seriously imperil the life of the patient, who was already very anæmic. Subtotal hysterectomy was therefore performed, the tumour and pregnant uterus being removed together, whilst both appendages were conserved. She made a smooth recovery and was able to leave the hospital at the end of three weeks. The accompanying figure represents the uterus and tumour as removed at the operation, the uterus having been incised along its anterior wall to disclose the contained fœtus. A piece has been removed from the anterior aspect of the tumour to display its structure. The



Pregnant uterus containing a four and a half months fœtus, with a fibroid tumour growing from the lower uterine segment and cervix on the left side. The growth had burrowed between the layers of the left broad ligament and was impacted in the pelvic inlet like a cork in a bottle. A portion of the anterior aspect of the tumour has been removed in order to display its structure. The cervix was situated high up and pushed over to the side of the pelvis. $\frac{2}{3}$.

section of the tumour was deep red in colour and was a typical example of the so-called "red degeneration."

In the treatment of such cases there can be no doubt that myomectomy, *i.e.*, enucleation of the tumour out of the uterus, is the ideal method, and one which commends itself to the surgical mind. The operation may be successfully performed without disturbing the course of pregnancy. Much, however, depends on the position of the tumour, whether it be single or multiple, and the amount of disturbance to the pregnant womb during the operation. A single tumour not involving the lower uterine segment or cervix, and bulging on the peritoneal surface, can be easily and safely enucleated without disturbing the pregnancy; but in many such cases no operation is indicated, for the pregnancy progresses and the tumour does not cause symptoms. It is otherwise when the pelvis is totally or partially blocked by a fibroid growing from the cervix or lower uterine segment and when pain is caused by the tumour. This pain may be the result of some degenerative change in the fibroid or be due to some inflammatory complication. I always practise myomectomy for uterine fibroids wherever possible, but in the present case, for the reasons stated, hysterectomy was preferred. If you can enucleate the tumour the gain to the patient, especially a young woman, cannot be overestimated. The menstrual functions are retained, as well as the power to conceive, and she knows that her internal organs have been preserved in their entirety. Another alternative is to allow the pregnancy to proceed till near the full term and then to perform a rapid Cæsarean section and either enucleate the tumour or, if this is not advisable, perform hysterectomy. Delay of this kind is done in the interests of the child, and may be considered where the tumour does not give rise to symptoms. It is further remarkable how Nature assists in causing the tumour or tumours to rise out of the pelvis. But where symptoms are produced, especially pain, it is clearly the duty of the medical attendant to recommend operation, for there is the further risk of septic infection at the confinement to which degenerated fibroid tumours appear to be specially liable.

The induction of abortion, followed by subsequent removal of the tumour or hysterectomy, is in my opinion a method of treatment not to be recommended. The patient is exposed to all the known risks attendant on the artificial termination of the pregnancy, and has to undergo a further operation at a later date. Pregnancy really makes the operation of hysterectomy easier, as the tissues separate so well, and owing to the increased size of the blood-vessels they are more evident and can be caught and tied without difficulty.

I would sum up the question of treatment by stating the following propositions:—

(1) That a large number of fibroids complicating pregnancy require no treatment.

(2) That pregnancy and labour progress undisturbed in a large number of cases.

(3) That where urgent symptoms are produced by a fibroid during pregnancy myomectomy, *i.e.*, enucleation of the tumour without disturbing the course of the pregnancy, is the ideal treatment.

(4) That where myomectomy is inadvisable, subtotal hysterectomy should be performed.

(5) That where a fibroid during pregnancy is not causing symptoms, but occupies such a position that it is certain to obstruct labour, the pregnancy should be allowed to proceed and Cæsarean section, followed by myomectomy or hysterectomy, should be done towards the end of pregnancy.

(6) That the induction of abortion is not to be recommended.

DISCUSSION.

Dr. Amand Routh agreed with Dr. McCann's dicta as to the correct treatment in these cases, but thought that the treatment of hysterectomy which he had adopted was contrary to the principles he had enunciated. He had never seen a case of pregnancy complicated by fibroids in the mid-period of the pregnancy requiring hysterectomy. The patient could almost always be so treated that any such operation could be postponed till near full term, or at all events till fœtal viability. He considered Dr. McCann had not given this case a sufficient trial of palliative treatment. He hoped Fellows of the Section would consider that hysterectomy in the mid-period of gestation was hardly ever a justifiable operation in the absence of clinical evidences of degeneration of the fibroid.

Dr. Blacker reminded the Fellows that at a recent meeting of the Section this subject had been discussed very fully, and that practically all those who took part in the discussion were agreed with the principles of treatment as enunciated by Dr. McCann. At the same time it must be remembered that only very severe pain was a sufficient justification for the performance of hysterectomy. Quite recently he had had a case of this kind under his care in which the patient, who had interstitial and subserous fibroids, had such severe pain that the administration of large doses of sedatives was required to relieve it. In spite of this, however, the patient went to full term. An important factor in any decision as to the treatment of these cases was the necessity for considering not only the preservation of the life of the mother but also that of the child. Dr. Blacker thought that in many instances this side of the question was rather overlooked and too little thought was given to saving the life of the unborn fœtus. He had never seen a case of fibroid tumours complicating pregnancy which required interference during the course of the pregnancy before the child was viable, and such cases must be of extremely rare occurrence.

The PRESIDENT (Dr. Herbert Spencer) thought it was rarely necessary to operate for fibroids complicating pregnancy in the early months, and very rarely indeed on account of pain alone. He had only known one case of pregnancy complicated by fibroids to terminate fatally out of a large number he had seen. The case was operated on for a pedunculated tumour, which had become twisted and had caused peritonitis. Personally he would have been inclined to wait in the case of the specimen exhibited, where pain and a slight transient rise of temperature were the only symptoms; but he recognized that the diagnosis in the case of a woman aged 25 from a twisted ovarian tumour might be difficult, and the tumour was invading the broad ligament and therefore was more likely to cause trouble. He had, however, removed a 17 lb. tumour from the broad ligament just before labour, which showed that very large tumours could be tolerated in this situation. With rare exceptions it was advisable not to interfere until the child was viable and it was possible to save both mother and child, either by natural delivery or by operation.

Dr. McCANN said it was difficult to express an opinion on the advisability of performing an operation when one had not seen the patient. The reasons which necessitated operation in the case under consideration were that the patient looked and felt extremely ill, and that the pain was severe, continued, and was not relieved by treatment. The question of an operation was carefully considered because it was desired if possible to spare the uterus and preserve the power to conceive. Cases where pain and discomfort produced by fibroids complicating pregnancy yielded to rest and medical treatment were well known, but the case described belonged to quite a different category. It is easy, when a tumour is lying on a plate, to say what one should do or what one should not do. When the tumour is inside the abdomen one does not know exactly what pathological process may be at work. A diagnosis of fibroid complicating pregnancy was made, but owing to the severity of the pain it would not have been surprising if some other complication had been found. At the operation the tumour was found to be wedged tightly in the pelvis, and on section it exhibited the typical appearance of red degeneration.

A Paravaginal Fibro-Myoma weighing 2½ lb.

By FREDERICK J. McCANN, M.D.

THE tumour was removed from a woman aged 36, the mother of six children. On August 11, 1907, she was delivered of twins, and I am indebted to her medical attendant, Dr. Gaff, for kindly furnishing the following report. He writes: "I saw her yesterday (July 7, 1908) and found her looking very well. I was sent for on August 11, 1907, by the midwife in attendance, as her patient had been some hours in labour and was becoming exhausted. On examination I found a large tumour bulging into the vagina and considerably obstructing the canal. The mass felt tense and incompressible. The os was well dilated and a head presented in the occipito-posterior position. I applied forceps, and with a little trouble got the head down to and then past the obstruction and delivered the child. I then discovered a second child presenting transversely and at once ruptured the membranes, turned, and delivered. There was as much difficulty in getting the after-coming head past the tumour as there had been in the former instance." The double placenta had to be removed manually. There was no excessive hæmorrhage and she made a good recovery. He further adds "that if she had had one large child I do not think the head would have passed without diminution of its size by craniotomy." No alteration in the size of the tumour was observed ten days after the confinement. Both children were males and were nursed for eight months. No discharge from the vagina was noticed during the lactation. A month before her admission into the Samaritan Hospital she complained of pain, together with difficulty in passing water. There was, however, no alteration in her general nutrition.

She was admitted into hospital on May 16, 1908, and, when an abdominal examination was made, a pyriform elastic swelling was felt perched on the top of a dome-shaped soft mass arising out of the pelvis. When the vulvar region was examined a distinct rounded bulging was observed on the right side of the anal orifice, numerous veins being evident on the surface. On separating the labia it was seen that the vaginal wall on that side was also pushed inwards.

The finger introduced into the vagina could not reach the cervix because the canal was elongated and partially obliterated by the pressure of the growth on the vaginal wall. A quantity of pus escaped when the finger was withdrawn.

The patient was anæsthetized and a more careful examination made. The upper segment of the vagina was seen to be ulcerating and a pool of pus had collected in this situation. The swelling on the summit of the tumour was proved to be the uterus. A curved incision down to the tumour was made outside the right labial margin. It was then found that the mass was encapsuled, and therefore another incision was made at right angles, dividing the vaginal wall up to the vault. The whole tumour was rapidly shelled out of its bed. The portion in relation to the rectum was so closely adherent that the lower end of the bowel was opened during the process of separation. The tumour projected into the anal canal, being only covered by mucous membrane. The tear was immediately repaired with catgut sutures. The hæmorrhage from the cavity occupied by the tumour was arrested and the incisions sutured. A piece of gauze was left as a drain for forty-eight hours, and the vagina plugged with gauze to keep up pressure on the obliterated cavity. The patient made a smooth recovery and left the hospital well.

Description of Specimen.—The tumour was a soft uniform rounded growth which weighed 2½ lb. It measured 6 in. by 5½ in., and on section resembled a fibro-myoma. Microscopically it was found to be a fibro-myoma with dilated lymphatic vessels. It had been enucleated from its capsule, which was plentifully supplied with blood-vessels. I have named the tumour paravaginal, for it was clearly different from a vaginal tumour and originated in the paravaginal tissues, being entirely below the base of the broad ligament. I have removed three vaginal tumours, two being myomata and one a fibroma, but they bore no resemblance to the tumour here described. I have failed to find any record of a similar case.

DISCUSSION.

The President (Dr. Herbert Spencer) thought that, as a matter of technique, it was a mistake to remove this tumour whole. It was possible that the injury to the rectum might have been avoided by removing the tumour piecemeal.

Dr. McCann, in reply to the President, said that the tumour bulged into the lower end of the rectum and that the mucosa in this situation was tightly stretched over it. Care was taken to avoid injuring the bowel, but this was found to be impossible owing to the thinned-out mucosa. Morcellement would not have afforded any advantage, and, as the nature of the tumour was not known, it would not have been wise to cut it up into pieces, and the hæmorrhage would have been much increased.

Longitudinal Section of the Cervix of an Infant showing Ectropion of the Cervical Mucosa.

Exhibited by REGINALD JAMISON, F.R.C.S.

IN the cervical canal the mucosa is natural, but on the vaginal aspect of the cervix the epithelium is columnar until a point near the vaginal reflexion is reached, where the epithelium changes to the usual stratified squamous type. Some glands are seen on that part of the vaginal portion which is covered by the columnar epithelium, but the shallow pits in the same situation are due to folds of the epithelium.

Gastroschisis.

By KEDARNATH DAS, M.D.

NOMENCLATURE AND CLASSIFICATION.

THE term gastroschisis has been adopted by Ballantyne after a very thorough critical review of cases of malformation in which there is a greater or less defect of the anterior abdominal walls with protrusion of the abdominal viscera. He rejects the old term "exomphalos" as it concentrated attention too much upon the umbilicus and included ordinary cases of umbilical hernia. The earlier writers referred to individual cases by a descriptive phrase. An extensive scheme of classification was introduced by G. Saint-Hilaire, and was improved upon by N. Joly. The various genera of the Saint-Hilaire-Joly scheme are as follow: Celosomus, pleurosomus, aspalasomus, agenosomus, cyllosomus, schistosomus, dracontisomus, chelonisomus, and streptosomus.

Ballantyne, who adopts a regional method of arrangement, does not employ the above system because he thinks that several of the names are confusing, or at any rate have a meaning not immediately obvious. The fœtus may be like a dragon or a turtle, but the likeness is not so striking as to make the name anything less than an etymological puzzle.

Forster's name for gastroschisis was "fissura abdominalis." He divided these cases into the complete form, into umbilical hernia, and into extroversion of the bladder, and under the first heading he subdivided the cases according to the region of the abdomen affected. Ahlfeld, however, pointed out that the defect rarely corresponded with any degree of accuracy to any anatomical region. He separated off ordinary umbilical hernia and extroversion of the bladder, and used "ectopia viscerum" as a synonym for "fissura abdominalis." There is no doubt that it is a better plan to separate umbilical hernia and extroversion of the bladder from the ordinary case of gastroschisis. This method has been adopted here. The idea of regional classification and nomenclature has been retained by Taruffi,[1] who arranges the specimens of gastroschisis as follows: (1) Epigastro-schisis, (2) epi-omphalo-schisis, (3) thoraco-omphalo-schisis, (4) hypogastro-schisis, (5) pleurosomato-schisis, (6) hypogastro-etro-schisis, (7) hologastro-etro-schisis.

As already stated it is far better to regard the types, other than extroversion of bladder, as only varieties of gastroschisis, not sufficiently clearly marked off from each other as to deserve separate treatment. As no system of classification is perfect, complexity, both in arrangement and terminology, has been avoided.

Clinical History.—The mother was a healthy primipara, aged 22. Labour pains began about four weeks before term. She was in active labour for more than thirty-six hours before a medical man was sent for. Dr. Kar, on examination, found something abnormal presenting, but was not sure about it. He, however, decided to examine her under chloroform, and in the meantime sent for me for further help. On arrival I found that Dr. Kar had just brought down a leg, and was engaged in completing the delivery. The extroverted abdominal organs, which were evidently the presenting part, were seen protruding out of the abdominal wall. There was no umbilical cord. The after-coming head was delivered with a little difficulty. The placenta followed immediately. There was some hæmorrhage during labour.

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[1] "Storia della tertologia," 1894, vii., p. 406.

Description.—The most obvious feature of the monstrosity was the absence of a portion of the anterior abdominal wall in the right upper quadrant. There was no umbilical orifice. The liver, stomach, spleen, pancreas, the small intestines and the major portion of the large intestines were outside the abdominal cavity. The heart could be seen pulsating through the intact diaphragm at the upper part of the rent, and it went on pulsating for about ten minutes. The margin of the ununited abdominal wall was evidently adherent to the margin of the amniotic sac, which contained the herniated abdominal viscera. There was no umbilical cord. There was very marked sinistro-flexion of the spinal column but no retroflexion. In the majority of the specimens of this monstrosity described in literature, retroflexion was the marked feature. The apex of the heart was on a level with the first lumbar vertebra. The head was comparatively large and measured 14 in. in circumference. The fœtus when stretched out measured 16 in. The abdominal cavity was practically empty. The descending colon was seen to pass from the ventral opening over the right iliac fossa into the pelvis. The testes were in the abdominal cavity. The left kidney was pushed right up in a pouch of the diaphragm, and was on a level with the heart, which lay on the right side of the spinal column. The right kidney was in the right lumbar region. On the fœtal surface of the placenta was a sac of the amnion which contained the herniated viscera. The cord, which was about 4 in. long, traversed the wall of the sac. It contained the usual vessels.

Acquired Atresia of the Introitus and Vagina in the Adult.

By H. Macnaughton Jones, M.D.

Instances of congenital malformation of the introitus resulting in complete atresia with or without involvement of the anus are not very rare. Bokai regarded simple atresia as the result of cell fusion, brought about by the cells which are derived from the Malpighian layer not becoming hardened as they reach the surface. Constant contact while in this condition brings about adhesion from apposition. It varies from a very slight to a complete degree of fusion.

I have already published an interesting case[1] (fig. 1) of such congenital defect. These malformations, however, are often associated with defects in the internal genitalia, as was the case in the child aged 3 that I referred to, and of which the drawing was shown at the time. In that instance there was only a vestige of rudimentary uterus. The cervix was represented by a nodule, the uterus as felt through the rectum was about the thickness of a quill, and the ovaries were absent. There was also a very short and contracted vagina.

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[1] "Diseases of Women," Ninth Edition, ii., p. 808.

Howard Kelly has recorded an almost similar case of a child aged 1 year and 8 months, but here there was an abnormally long fourchette which covered in the hymen and urethral opening. Two instances in adult life of prolongation of the perineal fold have been noticed and reported by me. I know of no case in gynæcological literature quite similar to that which I now bring before the Section.

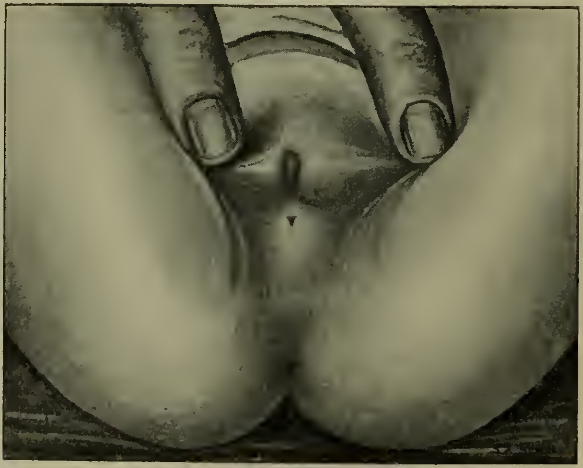

FIG. 1.

Congenital malformation of the vulva.

A patient aged 28 consulted me, with the following history: From girlhood the catamenia had been on and off irregular; there always was dysmenorrhœa, and occasionally menorrhagia. For some years there had been symptoms of slight disorders of mentalization, as shown at times by erratic acts and transitory delusions. From time to time similar mental disturbances had shown themselves, but of late years she had been much better, and she so far recovered as to take up nursing. She spent a few years in a hospital, but her health did not permit her to complete her training. She still, however, continued to nurse up to a comparatively recent period.

Her own statement (abridged) is as follows: Some twelve years back she suffered from what she described as "boils in the vulva." These gathered and burst; and these furuncular attacks occasionally recurred. She had no medical treatment, and complained very little of her suffering to her parents. Five years since she had rather a severe attack, after which she noticed "the skin of the vulva meeting together." For some time previously she thought "the opening had become smaller," but she is positive that as a child "the external organs were quite all right," and that the reduction in size of the parts was gradual. Only when she became a nurse did she realize that she was not like other women, and did not speak of it, as in consequence of her other illnesses she had no intention of marrying and dreaded an operation. She commenced to menstruate when aged 16, and for the first few years she suffered from irritation of the external organs during the catamenia. This irritation afterwards disappeared.

So far as she can recollect the first furuncle appeared twelve years since. Though she complained of this, little notice was taken as it passed off quickly. The inflammatory attacks generally occurred just before a catamenial period or immediately after. They "were attended by fits of depression or a longing to do something erratic." She became "cross and irritable," and the pain was intense. The purulent discharge was usually very offensive. Micturition during the time was very painful.

There had been no change in the local condition for the last few years. On examination I found the parts exactly as they are shown in the drawing (fig. 2). The only opening in the cuticular covering was the small slit of about ½ in. in length, through which she menstruated and passed urine. The clitoris was exposed above, considerably hypertrophied, and covered by a thickened and adherent prepuce. I could pass my little finger through the slit for about 5 cm. At the operation I divided the thin skin in the middle line and exposed the urethral meatus and the vaginal orifice. The vagina only admitted my forefinger to the first joint. Its walls were united by adhesions. These I forcibly broke down, severing some with scissors and discovering a short cervix. The uterine canal measured 1¼ in. I then resected the cuticular covering, uniting the labia minora right down to the margin of the labia majora, using buried and superficial interrupted cumol-gut sutures to bring together the lips of the wound. The vagina was packed with iodoform gauze soaked in sterilized oil, and the whole was dusted over with xeroform powder. She made an excellent recovery, and the result you see in the drawing, taken some nine weeks after the operation. During her convalescence a glass dilator was passed into the vagina and retained there for a few hours daily. When I last saw her I was able to pass with ease the dilator and the tubular speculum which I show. Practically the parts are now quite normal in appearance (fig. 3). Her answer in writing to the question if she had had any sexual desire or feeling is: "Perhaps a little, but nothing different to what there is since the operation."

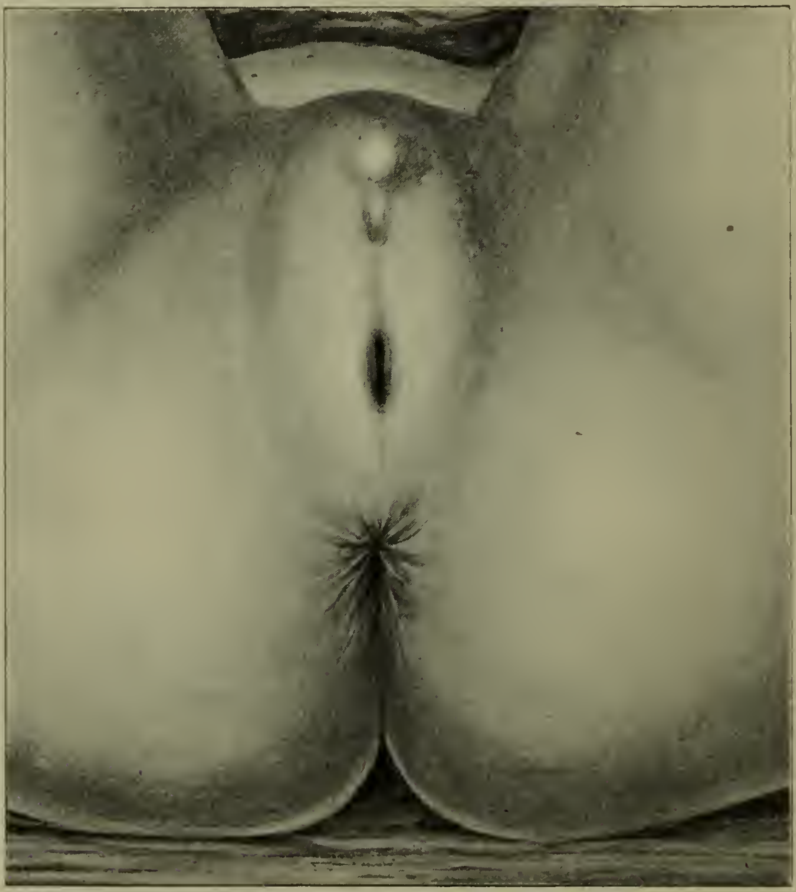

Fig. 2.

Acquired atresia. (Drawn at the time of operation.)

Not the least extraordinary part in this case is the marked change which has taken place in the patient's facial expression and general appearance since the operation. This has been noticed by all her friends, and the physical change has been enhanced by her mental brightness, which forms a strong contrast to her former habitual depression.

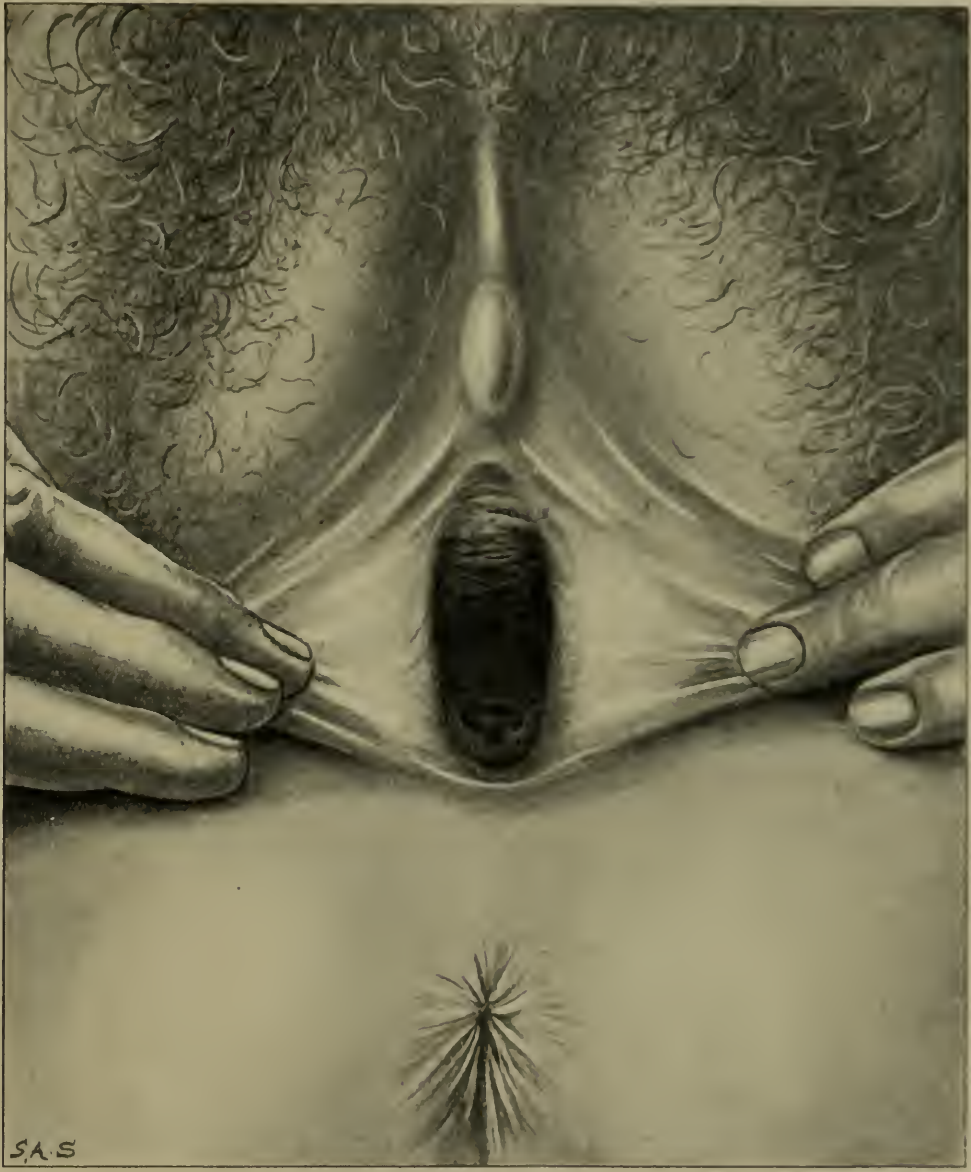

FIG. 3.

Result after operation.

Dr. MACNAUGHTON JONES said that in two other cases he had seen, in which there were congenital abnormalities of the external and internal genitalia, varying degrees of disorder of mentalization had been present. In one case in which the mental condition was such as to threaten the necessity for certificates, he had made an artificial vagina. Unfortunately a fistula formed with the bowel. This gave considerable trouble, but was ultimately closed. In this case a marked beneficial effect followed the operation, and the belief on the part of the patient that she was not unlike other women. The ultimate result was that the mental symptoms entirely disappeared. He believed that in many of these cases where such congenital anomalies were present there were also peculiarities of temperament and psychical effects.

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